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SELF-PROPELLING HYDRAULIC DREDGE.

A VERY LARGE MACHINE FOR MISSISSIPPI RIVER WORK—TO BE BUILT BY THE GOVERNMENT UNDER THE DIRECTION OF MAJOR HANDBURY, UNITED STATES ENGINEER CORPS.

In another part of this issue will be found an advertisement from Major Thomas H. Handbury, corps of engineers, U. S. A., Detroit, Mich., calling for proposals for the construction of a steel-hulled, self-propelling, sea-going, hydraulic dredge, designed for use in connection with the new jetties that are to be built at the southwest pass of the mouth of the Mississippi river. This dredge is a part of the project for that work, and $350,000 is now available for its commencement. It is to be a very large dredge and will probably take rank in efficiency and cheapness of output with any that has yet been constructed. In the matter of living quarters and general accommodations for the crew, and also as regards such modern machinery as steam steering gear, windlass, electric light plant, refrigerating apparatus, etc., this dredge will be the equal of many large sea-going merchant vessels. The strength of hull is expected to be beyond that of vessels of like class and carrying capacity in the merchant service and all parts are to be built in accordance with this idea.

The hull is to be 275 ft. long between perpendiculars, 50 ft. molded beam, and to hold 1,900 cubic yards of sand on a draught of 17 ft., and when light and ready for work to have a draught of not over 9 ft. The dredge will be propelled by twin screws. The speed going to the dump is expected to be not less than 10 knots per hour. The capacity of the dredging machinery will be equal to 2,000 cubic yards per hour of pumping time, when working under ordinary favorable conditions and taking the material from a depth of 30 ft. below water surface. Only general outlined drawings and such as may be deemed necessary to illustrate special features of the dredge will be furnished to the contractor. All detailed drawings necessary for its construction must be made by him as part of the contract. Delivery is to be made within ten months from the date of approval of contract and a penalty of $50 a day is required for all time after the date fixed for delivery. The hull, with sand bins, is to be built of steel throughout. There will be eight water tight compartments, formed by the collision bulkhead, each end and division of the forward bin, the water tight bulkhead between pump room and boiler room, the fore-and-after ends of after sand bins. Crew's quarters will be located forward of forward bin and aft of after sand bin. State rooms will be located under the floors of crew's quarters forward and aft. Raised fore deck and houses will be located on the main deck forward and aft and midships and will contain quarters for officers and crew, saloons, separate mess rooms for officers and crew, galley, cold storage room, linen lockers, china closets, bath rooms, water closets, etc.

The main dredging pumps—two of them—will be of the single-suction centrifugal type. They will be rights and lefts with respect to each other. Each pump will have a 20-in. suction and a 24-in. discharge opening, the discharge to be vertical. The shells are to be approximately 64 in. diameter and 30 in. deep, inside measurement. Each of these pumps is to be driven by a horizontal, direct-connected compound, condensing engine, capable of developing at least 350 I.H.P., at an approximate speed of 200 revolutions per minute, with boiler pressure of 135 lbs. per sq. in., and maintaining through the suction and discharge pipes the velocity necessary to carry at least 20 per cent. of sand with 80 per cent. of water against a maximum head of 32 ft.; this to be regarded as the average work of the engine, and to be done without overstraining the parts or heating the bearings. The two sets of suction pipes and appurtenances, to be of steel, will be located one on each side of the dredge. They will each be of 20 in. inside diameter, and from the center of the hole where they pierce the side of the dredge to the lower end of the drag, 80 ft. long, including 12 ft. of rubber hose to be placed about 8 ft. from the upper end. Hoisting engines of the double-drum friction-clutch type, one on each side of the dredge, will be provided for handling the pipes and for doing other work.

There will be four singled-ended return-tubular boilers (Scotch type), each of 11 ft. 3 in. length and 13 ft. 6 in. diameter, and each having three Morison suspension corrugated furnaces, 42 in. mean diameter. The working pressure is to be 150 pounds per square inch. Each boiler is to have not less than 63 sq. ft. of grate surface, and 2,217 sq. ft. of heating surface, and is expected to furnish steam to the extent of 600 I.H.P. without forcing, and shall have a total steam space of not less than 150 cubic feet. They are to be placed in pairs with the fire room between, and are to be so connected with each other and with the engines that they are to supply with steam that steam may be taken at once from all, or from any one of the boilers for any of the engines, as may be desired. An auxiliary boiler, to have a rating of at least 30 H.P., is also to be provided for the purpose of furnishing steam to such auxiliary engines, and heating system throughout the dredge, as may be required. Two ash ejectors (See pattern) and an approved ash hoist are features of equipment in this part of the vessel. Smoke stacks are to be of not less than 5 ft. 9 in. internal diameter.

The dredge is to be propelled by two screws of 8 ft. 6 in. diameter, with pitch suitable to 125 revolutions per minute, each screw to be driven by a vertical, inverted, surface-condensing, fore-and-aft compound engine, with independent condensers and air pumps. The engines are to be worked under a maximum boiler pressure of 150 lbs. per sq. in., and generally at a speed of 125 revolutions per minute with a boiler pressure of 135 lbs. Under these conditions they must be able to develop 800 I.H.P. They must also be capable of running easily at a sustained speed of 150 revolutions per minute, without undue strain or heating of parts, and when worked at lower rate of expansion, develop 1,000 I.H.P. Crank shafts, thrust shafts, propeller shafts, etc., are to be of open hearth steel. The condensers, two in number, are to be of Wheeler type. Feed pumps, high pressure pump for operating maneuvering machinery bin plugs, fire and washout pumps, etc., are all to be of Worthington make. Windlass and capstans are to be of the "Providence" kind, manufactured by the American Ship Windlass Co. The equipment also includes two stockless anchors, one to weigh about 5,000 lbs. and the other about 4,000 lbs. The distilling apparatus must be capable of furnishing 3,000 gallons of good, potable water in 24 hours. A cold storage room will contain about 1,000 cub. ft. of space and the refrigerating plant must be capable of keeping the room at a temperature of 34 deg. F. during the summer heat of the South Atlantic and Gulf of Mexico ports. The electric light plant is to consist of a direct-connected engine and dynamo, two 18-in. search light projectors, two 2,000 c. p. arc lights, sixteen 32 c. p., and 225 16 c. p. incandescent lights, as well as all switchboards, switches, lead and current wires, etc. The steam steering gear is to be of the kind manufactured by Williamson Bros. of Philadelphia. The dredge is to be heated throughout by steam.

VESSEL INTERESTS AT PITTSBURG.

ANNUAL MEETING OF THE NATIONAL BOARD OF STEAM NAVIGATION—AN ORGANIZATION THAT HAS DONE MUCH FOR SHIPPING.

Pittsburg, Pa., Sept. 19.—The twenty-ninth annual meeting of the National Board of Steam Navigation was held at the Monongahela House in this city yesterday. The meeting was called to order by President Hite at 11 a. m. There were present fifty-six members, representing steam vessel and towing interests throughout the United States. A paper was read and statements submitted by the first vice-president, Mr. M. E. Staples of New York, regarding the past work of the board and the necessity for future co-operative work; also the necessity of devising methods for increasing the membership and influence of the board.

Members of the board united in commending the paper presented by Mr. Staples and it will undoubtedly be taken as the text of an effort to increase the membership and widen the influence of the organization. Whatever may be said of the Lake Carriers' Association and other bodies that have done much for shipping, it must be admitted that the National Board of Steam Navigation was a pioneer in the field, especially as regards the work of preventing unwise legislation at Washington and generally protecting the ship interests of the whole country. This was clearly shown by a brief history of the work of the board contained in Mr. Staples' paper. He cited numerous instances of the successful efforts of committees at Washington from 1884 up to the present time. Mr. Staples commended in the highest terms the work of the American Association of Masters and Pilots of Steam Vessels of the United States and recommended co-operation with that body in matters involving mutual interests.

The question of bridges over navigable waters was very thoroughly discussed and referred to the committee on bridges. The question of a light buoy at the inner end of the swash channel, New York harbor, was also discussed and referred to the committee on fog and light signals, and they were instructed to take the same up with the United States light-house department.

The rule prohibiting passengers from entering pilot houses of steam vessels was very thoroughly discussed and referred to the executive committee for such action as they might deem proper, as was also a schedule of annual dues reported by a special committee.

The financial condition of the board was carefully investigated by an auditing committee and reported to be in first-class condition. A very large balance was found in the treasury. Ten new members were elected, all of them representing very large steamboat and towing interests. The following officers were unanimously elected for the ensuing year: W. W. Hite, president; M. E. Staples, first vice president; R. C. Veit, second vice president; W. J. Wood, treasurer; Charles H. Boyer, secretary. Later on the executive committee appointed the following standing committees for the ensuing year:

Legislative Committee—Walter B. Pollock, chairman; W. O. Sprigg, P. H. Marshal, F. H. Laidley, J. A. Henderson, D. B. Blackburn, N. P. Doane

Committee on conference—J. W. Miller, chairman, J. A. Henderson, F. A. Laidley, B. D. Wood, H. B. Moore, Sr.

Committee on bridges—Frederick Russell, chairman, F. A. Rothier, Robert Wilmot, G. C. Meissonnier, M. Moran.

Committee on record and statistics of the board—C. H. Boyer, chairman, F. W. Vosburg.

Committee on fog and light signals—Robert Rogers, chairman, F. B. Dalzell, D. B. Blackburn.

It was decided to hold the next annual meeting in New York city in the latter part of September or early part of October, 1901, the exact date to be determined by the executive committee. A special committee on membership was appointed to communicate with all steam vessel owners of the United States and to prepare and to present to such interests a circular letter setting forth the work accomplished by the board, the necessity for co-operation and organization in order that the steam vessel interests of the country might be properly protected against hostile legislation and benefited by favorable legislation.

The members of the board were royally received on their arrival at Pittsburg. Today they were entertained on the steamer Mayflower, taking a trip through the waterways of Pittsburg and inspecting the various industries. A sumptuous luncheon was served on board.

An aggravating error of the types appeared in an article in the last issue of the Review dealing with shipments of freight to and from Lake Superior from the opening of navigation to Sept. 1. Shipments of bituminous coal should have been 2,702,959 net tons instead of 3,702,959 tons.

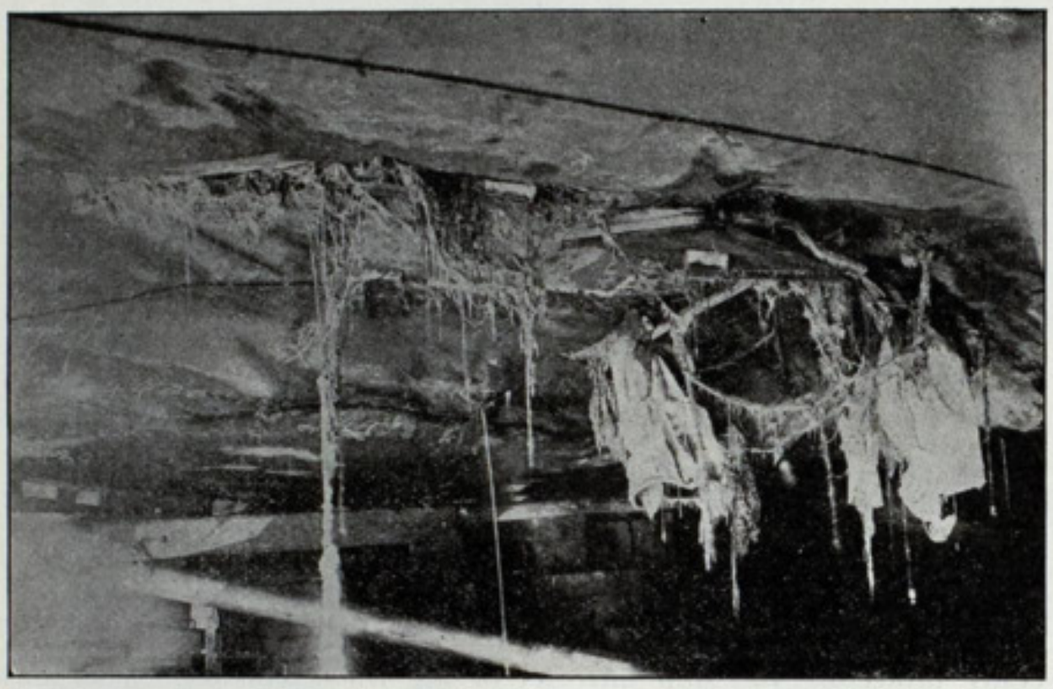
DEATH OF REAR ADMIRAL SICARD.

Rear Admiral Montgomery Sicard died of apoplexy at 9 o'clock last Friday morning at his summer home, Westernville, N. Y. He retired from the service Sept. 30, 1898. He was born in New York in 1836, and, when fifteen years old, entered the naval academy, where he remained four years. His promotion in the navy was rapid. In 1858 he was made master; in 1861, lieutenant; in 1862, lieutenant-commander; in 1870, commander; in 1881, captain; in 1894, commodore, and in April, 1897, rear admiral. He served as executive officer on the Oneida of the West Gulf squadron during 1862-3 and took part in the bombardment and passage of Forts Jackson and St. Philip, the destruction of the confederate flotilla and gunboats, the capture of the Chalmette batteries, and, later, the capture of New Orleans. In July, 1862, he engaged in battle with the Vicksburg batteries and the confederate ram Arkansas. During the attacks and capture of Fort Fisher he commanded the Seneca, and in the naval land assault on the same fort, Jan. 15, 1865, he led the left wing of the second division. From 1881 to 1890 he was chief of the bureau of ordnance, and to him is due the credit of introducing into the navy the steel high power ordnance. In 1897-8 he was commander-in-chief of the United States naval force of the North Atlantic station. He was later placed on sick leave, and during the war with Spain, being only partly recovered, he was made president of the naval war board.

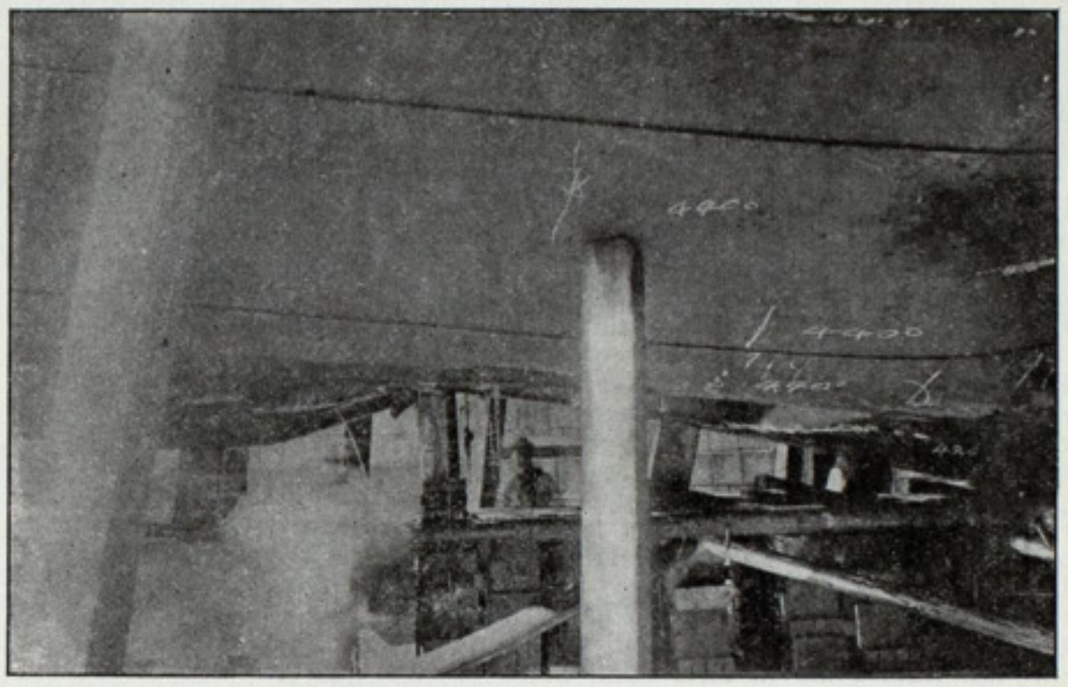
NEW WILSON LINE STEAMER TORONTO.

The twin screw steamship Toronto, which arrived at New York on Sept. 9 from Hull, is the latest addition to the Wilson line of steamers of which Messrs. Sanderson & Son are the New York agents. She was built by William Gray & Co., Ltd., and is the first twin screw steamer built and engined at West Hartlepool, England. Her principal dimensions are 469 ft. by 52 ft. by 34 ft. Her dead weight capacity is over 8,500 tons, and her measurement capacity 11,400 tons. She is built with a continuous shelter deck for cattle, and above that is a long bridge, in which all the accommodation for passengers, officers and crew is located. The vessel has four masts, eleven powerful steam winches, and a large number of cargo derricks, together with gear for the rapid handling of cargo. A cellular double bottom extends throughout the length of the ship for water ballast. The fore peak and after peak are also constructed as water ballast tanks, and there are two deep ballast tanks built in the holds. Powerful steam and hand steering gear is fitted in a large wheel house aft. A complete system of electric lighting is fitted throughout, and the arrangements and equipment embody everything which the experience of the owners and builders can suggest to make the vessel efficient. Her propelling machinery consists of twin sets of triple expansion engines, each set of engines having cylinders 22 in., 37 in. and 64 in. diameter by 42 in. stroke. Steam is generated in four large single-ended steel boilers, adapted to work at a pressure of 200 lbs. per square inch, and fitted with induced draft. Bronze propellers have been fitted, together with a liberal installation of auxiliary machinery.

Injuries Sustained by the Oregon.

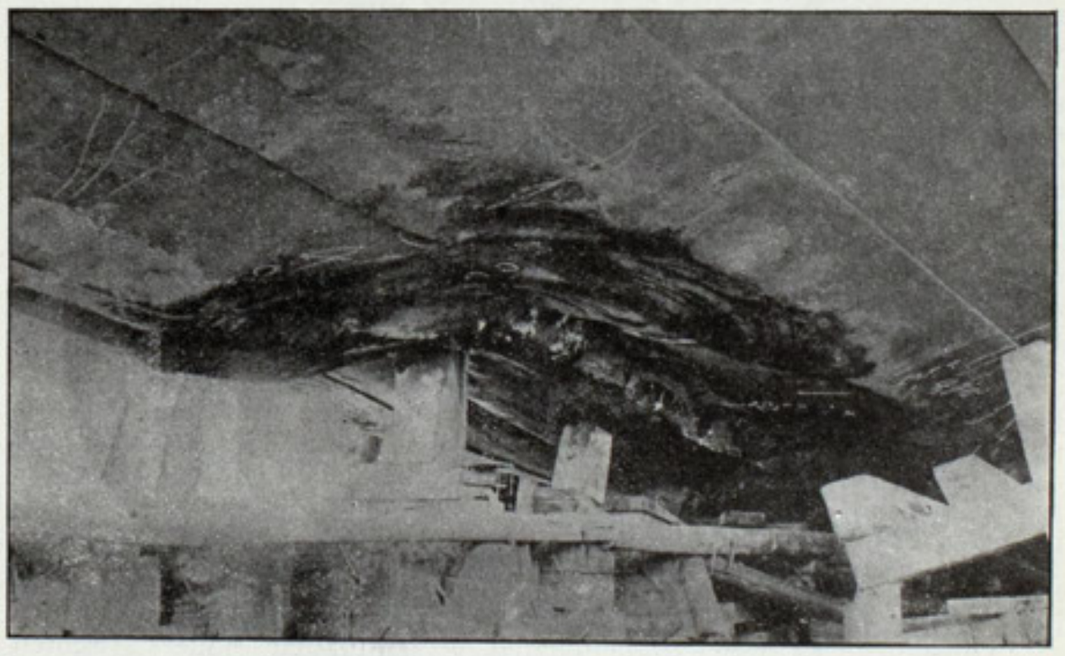


View from port showing temporary patches put on by diver over injuries between frames 19 and 24. Kure, July 25, 1900.



View from port and underneath showing injuries between frames 21 and 24.

View from port and underneath showing injury to keel between frames 14 and 19.



Broadside view from port showing injuries to keel between frames 14 and 19.

CONDITION OF THE OREGON.

It is probable that the battleship Oregon will be ordered home from the Asiatic station. The reports and photographs received from Kure of the injuries sustained by that ship on its way to Taku show that it was damaged to a greater extent than was at first supposed or than has been indicated in the previous reports from naval officers attached to the ship. The attempt to repair the damages must have been of the most temporary character, and consisted largely of filling in the huge apertures with timber framework covered with sheet iron. The repairs are described as merely something to keep the water out, and it is doubtful if the permanent repairs can be done at Hong Kong. It is estimated that it will require several months to complete the work, which includes a great deal of internal construction.

Messrs. Caird & Co. have recently launched from their yard at Greenock, Scotland, the steel screw mail steamer Persia for the Peninsular & Oriental Steam Navigation Co. This vessel is 500 ft. long, 54 ft. wide and 37 ft. 6 in. deep; gross tonnage, 8,000; I.H.P., 11,000.

The cruiser Hogue, recently launched from the yard of the Barrow Ship Building Co., England, is one of the heaviest vessels launched from any ship building stocks. Her net weight was 8,000 tons and her draught after launching 17 ft. 6 in. forward and 20 ft. 6 in. aft.

A dispatch from Portland, Ore., says that while going at a record-breaking clip in a preliminary test of her machinery, the torpedo boat destroyer Goldsborough met with an accident similar to one which occurred on Feb. 25 last, breaking the rocker shaft on the port engine. Chief Engineer Bodmar had ordered a full head of steam turned on to make a test of speed, and was engaged in taking record of the revolutions when the shaft snapped. He estimated that she was going over 33 knots an hour and everything was working beautifully. No damage was done to the other machinery, and a new shaft had been sent for, which will require about a month to replace. The accident will cost the builders, Wolff & Zwicker, Portland, Ore., about $5,000.

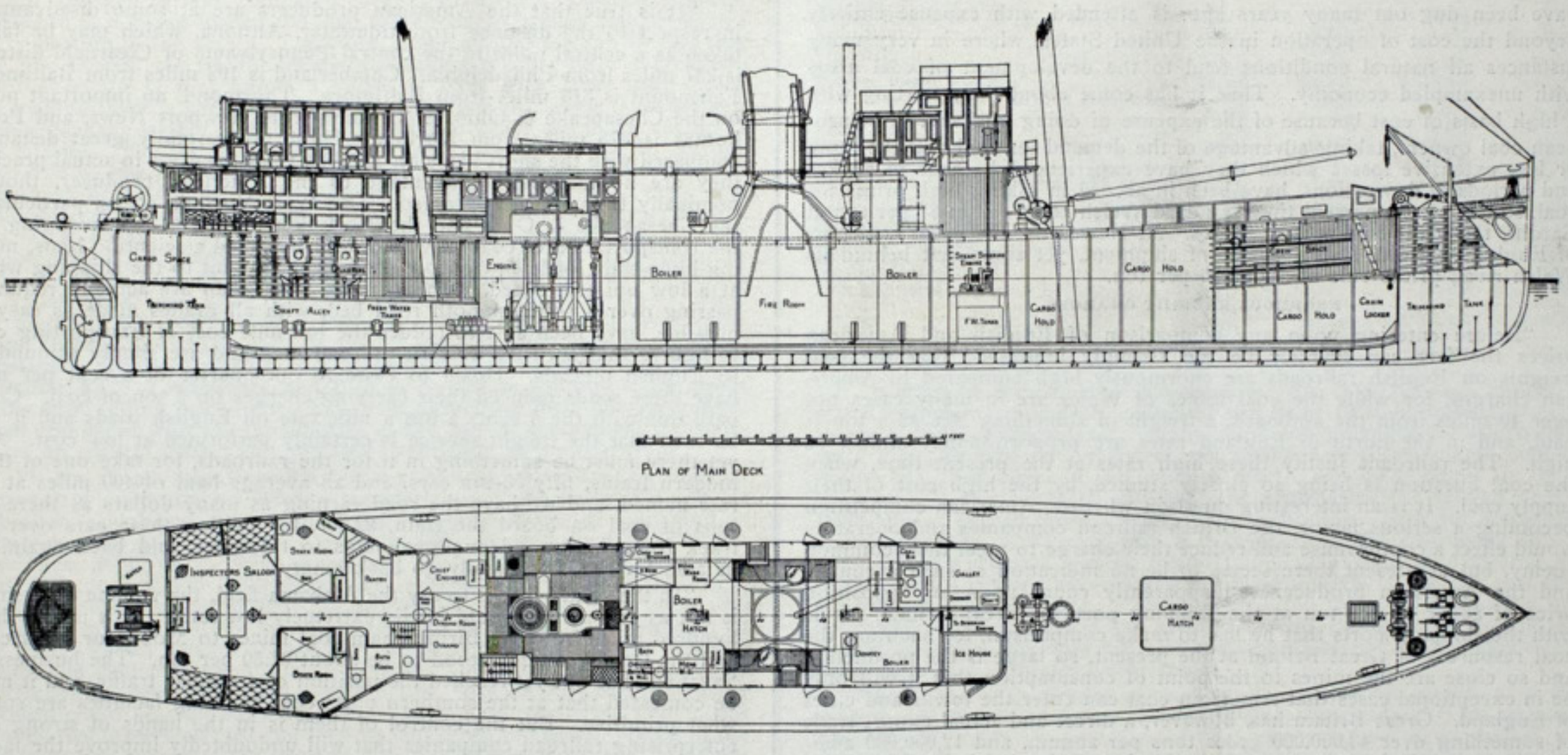
In the Blue Book of American Shipping, a directory of shipping interests published from the office of the Marine Review, Holzapfel's Composition Co., Ltd., of New York, are put down under the heading "Composition for Ships' Bottoms" as manufacturers of American improved Rahtjen's anti-fouling composition. This was an error in compiling the book, which was made, however, without the knowledge of the Holzapfel company, which was some time ago enjoined from using the name Rahtjen.

AWARD OF CONTRACT FOR LIGHT-HOUSE TENDER HEATHER.

Moran Bros. Co., Seattle, Wash., have received word by wire from Washington that they have been awarded the contract by the light-house board for the construction of the light-house tender Heather for the Oregon station. This is one of the most perilous of the light-house districts. A complete description of this vessel, which is a departure from the usual style of tenders, was published in the Review of Feb. 8. The vessel's dimensions are: Length, 178 ft. 6 in.; beam, 28 ft. 6 in.; depth of hold, 15 ft. The vessel will be built entirely of steel and everything about her will be of American manufacture. She will have five main bulkheads, water tight, making six main water tight compartments. The two endmost compartments will be divided by trimming tanks. The coal bunkers are 38 ft. in length and are in themselves water tight. Consequently the ship has ten water tight compartments—six main and four subdivisions. The Heather is fitted with big, fresh water tanks, sufficient not only to supply drinking water on her long voyages, but to replenish the boilers as well. She has a Globe steam steerer (Cleveland make) and an automatic towing machine of the Shaw & Spiegle type. A patent windlass and an electric plant for lighting purposes will be other features of equipment. The vessel will have a big forward deck for buoy work. A deck house extends two-thirds of the ship's length and will be built entirely of steel and riveted down to the deck beams to secure solidity. The conflict of the Columbia river with the open sea makes a most vicious surf and frequently causes a solid wall of water 20 ft. in depth to run over the stern. There will be therefore not a particle of woodwork in the deck house, which will be built to withstand a terrific pressure.

In the deck houses are the inspector's quarters, chief engineer's room, dining room and galley. Below the main deck aft are the staterooms for officers of ship and mess room; below the main deck forward are the crew's quarters with separate apartments for seamen and firemen. The pilot houses and master's room are on top of the main deck and in the deck house aft is the chart room and office for inspector. The Heather is rigged as a two-masted schooner without square rig and is fitted with derrick and hoisting apparatus for hoisting buoys and chains and doing the necessary work of a tender. The vessel will also be fitted out as a supply ship with abundant room for stowage.

The engine will be of the compound, open front, surface condensing type, with cylinders of 23 and 43 in. and a stroke of 30 in. She has two Scotch boilers, 12.6 ft. in diameter and 12 ft. in length. The condenser has a cooling surface of 1,650 sq. ft. The ship will have a steam reversing gear and a single propeller, the latter about 9.6 ft. in diameter. A water service pump will furnish a constant flow to bath rooms, wash room and water closet. Tub and needle baths will be provided for all hands. A steam ash ejector is another feature of the equipment. The piping will be all of copper and the pipe and boiler covering will be of the best quality of magnesia. The equipment of the vessel will be most complete in every detail.



DECK PLAN AND LONGITUDINAL SECTION OF THE HEATHER.

MARVELOUS SPEED OF THE COBRA.

A cable dispatch says that the torpedo boat destroyer Viper's marvelous record of 43 miles an hour has already been eclipsed, and the fastest vessel in the world is now her sister ship, the Cobra. The latter was built by the Armstrongs and is an exact duplicate of the Viper, which was built by Hawthorne, Leslie & Co., at their works at Newcastle. Both have the Parsons turbine engines. The contract speed of each was 34 knots. The Viper did 37.113 knots on July 13. The Cobra, in an unofficial trial over the same course at the mouth of the Tyne the other day, made 37.7 knots, or 43.5 miles. Her engineers say that she has not yet done her best, and that they expect fully another knot. The admiralty has now taken over the Cobra and official test will shortly be made.

The United Engineering Co. of New York were the lowest bidders for the erection of a pumping plant for dry dock No. 3, Brooklyn navy yard.

GALVANIC ACTION OF COPPER SHEATHING.

The Naval and Military Record of London, for August 30, contains an account of galvanic action of copper sheathing on the cruisers Ariadne and Spartiate which will undoubtedly be taken up by those who are opposed to the policy of sheathing the cruisers of the American navy. Indeed the representations are such as to merit serious consideration. The correspondent of the Naval and Military Record says:

"It has been discovered that the brass bolts of the underwater fittings of the cruiser Spartiate have been badly corroded by the chemical action of the copper sheathing. The Ariadne and Spartiate, sister ships, are in dry dock at Portsmouth, side by side, and both ships have been similarly affected. A few days since, the Ariadne, when at her buoy, was found to be leaking rapidly, and it was assumed that a Kingston valve had been inadvertently left open. She was, however, hurriedly docked, when it was ascertained that, owing to the corrosion of the bolts inside and outside the ship, the mountings of one of the under-water fittings had fallen off; hence the inrush of water. The corrosion of the outer bolts of the Spartiate had been previously detected, but an examination of the inner bolts showed that the action was going on there also. A report on the discovery has been forwarded to the admiralty."

The Record makes the following editorial mention of the correspondent's report:

"That was a very ugly discovery which was made on the Ariadne the other day, and repeated on the Spartiate. The galvanic action of copper on other metals is by no means a new disease. For years we have been experimenting to overcome it, and for a time zinc was believed to be an effectual prophylactic. Then naval brass, so compounded as to embrace all the panaceas, was adopted, and now in two of our finest cruisers it has proved a failure. I leave it to the imaginative correspondent to describe what might have happened had the Ariadne lost the mounting of her under-water fitting while chasing the enemy during the maneuvers, but it requires little imagination to realize that serious damage may result from under-water fittings dropping off in the ocean owing to corroded bolts. One cannot, however, fail to smile at the comic side of the question. Here we have ships copper-sheathed in order that they may keep the sea for lengthened periods, and yet, because they are copper-sheathed, they cannot go through the maneuvers without becoming so leaky as to threaten their own safety."

COAL CONSUMPTION OF THE TURBINE.

The efficiency of the steam turbine motor for the propulsion of such craft as torpedo boat destroyers has been amply demonstrated, first with the little Turbinia, and more particularly by the Viper, which has passed through her official steam trials under the direction of the British admiralty with pronounced success in every respect, attaining on a three-hours' trial the satisfactory speed of 33.838 knots. More could probably have been done, but this more than satisfied the contract conditions. The only point remaining to settle had reference to the economy of the steam turbine in comparison with the reciprocating engine; and the results are now available. As the power developed could not be determined, the only measure for fair comparison is the consumption per hour for a given speed. On a three-hours' trial at 31.118 knots the Viper burned 8.86 tons of coal per hour, or 19,846 lbs.; and on a three-hours' trial at 33.838 knots the consumption was 11 tons, 9 cwt., 1 qr., 1 lb., or 25,685 lbs. per hour. The Albatross, which was built and engined by Messrs. Thornycroft, is the only destroyer with reciprocating engines which has on official trials made a speed approaching to that of the Viper, and here the speed was 31.552 knots, with the engines indicating 7,732 H.P. The displacement of the Albatross is 384½ tons and of the Viper 385 tons; while the coal consumed per hour for 31.552 knots for the former was 17,474 lbs., and for 31.118 knots of the latter 19,846 lbs. per hour—a basis of comparison which requires no comment.

Babcock & Wilcox boilers have been awarded the grand prix at the Paris International Exposition, 1900.

EXPORTS OF AMERICAN COAL.

THE POSSIBILITIES OF THE UPBUILDING OF AN IMMENSE TRADE ARE POINTED OUT CAREFULLY AND ELABORATELY.

Mr. F. E. Saward, honorary special commissioner of the United States mines and metallurgical department at the Paris exposition, has just contributed a thoughtful and valuable article upon the possibilities of the American export trade. Mr. Saward says:

"The coal trade is, of all the industries affected by periods of financial depression, the last to experience the changes due to varying conditions. Happily, it can now be said that the bituminous coal trade of the United States, having recovered from the severe depression following the panic of 1893, is, by reason of the newly originated foreign demand, placed in a position of unparalleled strength, and it is the confident belief of those largely interested in coal that the stability of the industry is assured for many years to come. The fundamental basis for this prosperity lies in the fact that world-wide activity in coal consumption is coexistent with limited supplies abroad and unlimited supplies in the United States. By this it must not be understood that the foreign production of coal is decreasing. On the contrary, it is increasing. Yet there are limitations upon the coal areas abroad, it being thought that every available coal deposit of Great Britain has been prospected and measured, and even in Germany there is probably no virgin territory such as the United States has such vast areas of. This operation of European mines, then, in old established coal regions where the most readily accessible deposits have been dug out many years ago, is attended with expense entirely beyond the cost of operation in the United States, where in very many instances all natural conditions tend to the development of coal areas with unexampled economy. Thus it has come about that, starting with a high basis of cost because of the expense of doing business, the European coal owners, taking advantage of the demand for coal and the more or less extensive losses which they have experienced because of strikes and periods of depressions, have been in accord in asking high prices for coal, so that at the present time standard Welsh coals sell at $7 per ton at Cardiff, the great coal port of Wales. At Newcastle, the great coal port of England, an old, historic place of shipment, yet somewhat behind its Welsh rival, prices rule at about $6 per ton.

ENORMOUS FREIGHT CHARGES.

"Before entering upon any comparison of English and American prices the fact can scarcely be too strongly impressed that the coal freights on English railroads are enormously high compared to American charges, for while the coal mines of Wales are in many cases not over 40 miles from the seaboard, a freight of something like $2 a ton is paid, and in the north of England rates are proportionately almost as high. The railroads justify these high rates at the present time, when the coal question is being so closely studied, by the high cost of their supply coal. It is an interesting question whether, American competition becoming a serious factor, the British railroad companies and operators would effect a compromise and reduce their charge to meet their common enemy, but at present there seems to be no indication of such a course, and the American producer can apparently count upon an opposition price of $6 or $7 per ton at the shipping ports of Great Britain. It is with the shipping ports that he has to make comparison, for such are the coal resources of Great Britain at the present, so large is the production and so close are the mines to the point of consumption that it will only be in exceptional cases that American coal can enter the towns and cities of England. Great Britain has, however, a direct and actual export trade of something over 43,000,000 gross tons per annum, and 12,000,000 additional are supplied to steamers in the foreign trade, and it is with regard to this that the American coal producer is interested. Going to practically every country in the world, the United States not excepted, this trade takes an enormous tonnage each year from the mines of the producing country, and limited as they are with respect to the needs of future generations, many business men and men in public life are strongly impressed with the idea that the export business is not especially desirable. Why, they ask, should we sell our coal knowing that the future will find it exhausted, send it to neighboring countries for the use of manufacturers and have finished products made with it come back and be sold to the detriment of our own workingmen? It is among the possibilities of the near future that an export duty will be placed upon coal by the government of Great Britain, thus giving American producers an increased advantage.

"Now to study the situation on this side. The American coal which is destined to compete with the coals of England and Wales in the markets of the world is the bituminous or soft coal produced in Pennsylvania, West Virginia and Alabama. Anthracite coal has practically no opportunity for foreign exploitation at the present time or in the near future. It is a fuel so much different from the coal that foreign consumers have been accustomed to using that they are not at all inclined to take it up, necessitating as it does the use of new grates or new stoves and entirely different methods of firing. We need therefore consider only the several varieties of soft coal now finding a market abroad. In Pennsylvania there is produced for the seaboard trade what is known as Clearfield coal, originating mostly on the line of the Pennsylvania railroad, but also reaching market over the Philadelphia & Reading railway. This general name includes the coal from several minor regions and is a comprehensive trade term. Further to the westward is the Pittsburg district, closely centering about the metropolis of the western portion of the state. Some coal from the eastern portion of this district reaches tidewater by rail over the Pennsylvania, but the hopes of those who expect an export business in Pittsburg coal are based upon the fact that during certain portions of the year cheap transportation to the port of New Orleans can be had via the Ohio and Mississippi rivers. In Maryland the famous Cumberland coal is produced, but this is a decidedly soft coal, breaking into small pieces rather than crumbling, but yet is not in favor with foreign consumers, notwithstanding its richness in fuel properties, because the foreign trade demands a lumpy coal. For that reason the Cumberland can be left out of calculations concerning export trade.

CHEAP FREIGHTS TO TIDEWATER.

"In the state of West Virginia there are three important railroad lines closely identified with the coal trade. In the northern portion of the state is the Baltimore & Ohio, further south the Chesapeake & Ohio, and still further south the Norfolk & Western. Tributary to the line of the Baltimore & Ohio are the Elk Garden and Fairmount regions. The first named is not far distant from the Maryland border, and its coal is somewhat like the Cumberland product, yet it has been exported with satisfactory results, and there is also a considerable coke trade from that region. This is the district in which the so-called senatorial field of Davis & Elkins is very largely interested. In the Fairmount region there are a number of important companies working, most of them, close by the town from which the region derives its name. The Chesapeake & Ohio also serves two districts, known respectively as the New River and the Kanawha. The New River district lies in a direction approximately east of the Kanawha, and that stream being a tributary of the Kanawha river, the road passes directly from one region to the other without crossing any dividing summit. Yet while there is little physical separation between the two districts there is considerable from a trade standpoint. Very little Kanawha coal comes east and comparatively little New River coal goes west, therefore it is from the New River district on the line of the Chesapeake & Ohio that coal for the export trade will originate. The other West Virginia line, the Norfolk & Western, serves but one district, one decidedly large and not sharply defined, the Pocahontas. The Alabama coal district is in the northern part of the state, near Birmingham. Shipments can be made either to Mobile or Pensacola, on the Gulf coast, or even to Savannah, but up to the present time the trend of the business has been to Pensacola.

"It is true that the American producers are at some disadvantage in respect to the distance from tidewater. Altoona, which may be fairly taken as a central point in the central Pennsylvania or Clearfield district, is 237 miles from Philadelphia. Cumberland is 192 miles from Baltimore. Fairmount is 316 miles from Baltimore. Thurmond, an important point on the Chesapeake & Ohio, is 420 miles from Newport News, and Pocahontas is 375 miles from Norfolk. These are certainly great distances compared with the short hauls on English roads, and yet in actual practice they are no material disadvantage to the American producer, though nominally they might appear so. The West Virginia roads, particularly the Chesapeake & Ohio and the Norfolk & Western, by arranging for the transportation of coal on what might be called a scientific basis, moving huge train loads entire from some central point to the shipping wharf at a low uniform speed, with no more stops than are actually required, passing over a solid, smooth road bed, with all grades made as easy as possible, have been able to reduce the ton-mile cost of transporting coal to figures that surprise western railroad men and are simply astounding to English officials. Down to close to one-quarter of a cent per mile have these roads reduced their carrying charges on a ton of coal. Compare this with the 5 cents a ton a mile rate on English roads and it will be seen that the freight service is certainly performed at low cost. And yet there must be something in it for the railroads, for take one of their modern trains, fifty 55-ton cars, and an average haul of 400 miles at the rate named, and we have the road earning as many dollars as there are tons of coal on board the train, $2,500, for pulling these cars over the track from Thurmond or Pocahontas to tidewater, and back again, let us add, for the cars usually go back empty.

"In the south, that is to say the Alabama field, the volume of business is not as yet such as would justify extremely low rates. It is nearly three hundred miles from the Birmingham coal mines to Mobile or Pensacola, and the freight is understood to be about $1.50 per ton. The business to Savannah has not yet reached the position of a regular traffic, and it must be confessed that at the southern ports coal handling facilities are somewhat primitive. But the control of them is in the hands of strong and enterprising railroad companies that will undoubtedly improve the facilities when business warrants. Turning aside for a moment to consider the conditions at New Orleans, we find that the coal reaching there from Pittsburg comes down the river in lightly constructed boats, that would be termed scows in New York harbor, and when destined for bunkering or export is put on board steamers by hoisting with small buckets. This makes expensive handling, and is a disadvantage which only the cheapness of river transportation from Pittsburg and the nearness of New Orleans to desirable markets prevent from being a damper on the hopes of the Pittsburg people.

CHEAP SHIPPING POINTS.

"Examining the more northerly ports, those on Chesapeake bay and its tributaries, we find unexampled facilities for coal shipment. The coal is received in railway cars, which run on to a high trestle, and by carefully devised bins and chutes the largest vessels are loaded with coal at any stage of the tide, speedily, with very little labor and with a minimum amount of breakage. These loading ports are Lambert's point, Norfolk harbor, where the Norfolk & Western railroad has two large piers abutting directly on the east side of the channel of the Elizabeth river, with between 25 and 28 ft. of water at low tide. Some 10 miles distant, across Hampton Roads, where the depth of water reaches 65 ft. off the end of the coal wharves, is the tidewater terminus of the Chesapeake & Ohio railway, which has at this point one old wharf and one new wharf of very large capacity. Like the other coal-loading wharves, they are built on one general plan. Something like a mile to the northwest from these wharves is the plant of the Newport News Ship Building & Dry Dock Co., which, being under the same management as the Chesapeake & Ohio coal agency, is expected to play an important part in the furnishing of vessels for the trans-Atlantic coal trade. In Baltimore there are the piers of the shippers over the Pennsylvania in one group and those of the shippers over the Baltimore & Ohio in another group. The terminus of the Pennsylvania line is at Canton, while the Baltimore & Ohio has in the past had all its Baltimore piers at Locust point, but now built a very large coal pier at a point in the harbor known as Curtis bay, especially for the extra trade. The erection of this pier is a gratifying recognition, in the minds of many coal men, of the new state of affairs, for it must be confessed that the strain put upon the railway companies to

supply the home demand during last fall and winter caused some of them to pay little heed to the export business, as they felt that they had about all they could attend to; hence the prompt action of the Baltimore & Ohio in meeting the new conditions has been received favorably by those who depend upon that road for facilities. In Philadelphia harbor there are two important coal shipping ports—Greenwich, the great terminus of the Pennsylvania railroad, and Port Richmond, the terminus of the Philadelphia & Reading. The Baltimore & Ohio also has a shipping port in Philadelphia harbor known as the Green street wharves, but by preference it does the bulk of its business at Baltimore. In New York harbor the soft coal shipping wharves are as follows: South Amboy, terminus of the Pennsylvania railroad; Perth Amboy, Lehigh Valley property; Port Reading, owned by the Philadelphia & Reading; St. George, Staten Island, owned by the Baltimore & Ohio; Port Liberty, Jersey City, used by the Central railroad of New Jersey for shipping Beech Creek coal, and Harsimus piers, Jersey City, owned by the Pennsylvania railroad. The Erie Railroad Co. also has piers in New York harbor, but it is understood that most of that company's soft coal goes to the west.

NEED OF SPECIAL STEAMERS.

"As yet scarcely any exportation of coal has been done from New York, and whether there will be any or not depends very largely upon how the question of ocean transportation will finally be solved—whether by boats run for coal carrying only by utilizing 'tramps' that come for general cargoes. And this brings us to the most interesting stage of the whole question—the getting of the coal across the water. With the expenditure of relatively small amounts of money in a short time our great coal carrying railroads can lay down at tidewater millions of tons more each year than they now bring forward, but, granting this, we are at once confronted with the question of vessel supply. There appears to be a distinct reluctance on the part of the owners or agents of the ordinary 'tramp' steamer to take coal as a cargo. In the first place it is dirty, and when it is being loaded the dust therefrom penetrates and permeates every portion of the vessel. Therefore, if something else can be had that will pay as well, the tramp steamer will take the other offer every time. Another factor is that unless a vessel is built with large open holds the loading takes a great length of time and the unloading takes longer. Hence package freight is preferable for vessels which are much cut up in the interior. The result has been that coal men sending coal to Europe have had to pay between $4 and $5 per ton for transportation. Even so they have been able to reach European ports and introduce their coal with noticeable profit. Take the selling price as $2.50 at Hampton Roads, add say $5 freight, and we have $7.50 as the cost of American coal in the Mediterranean. Compare this with Welsh coal, $7 per ton, freight to Gibraltar $2.16, total $9.16; freight to Marseilles, $2.70, total $9.70; freight to Naples $2.58, total $9.58. Granting that the American producer, when the merits of his coal become known, can get as much as the Welshman—and there is no reason why he should not—we have here instances of substantial profits, for there is a margin of $1.56 on American coal at Gibraltar, $2.20 at Marseilles, and $2.68 at Naples, in addition to the profit in the $2.50 selling price here. Yet these figures are insignificant, indeed, when compared with the possibilities in the way of economical transportation on colliers owned and operated exclusively in the coal trade.

"It has already been calculated by a careful compilation of figures that the cost of operating a 7,000 ton steamer to such an accessible port as Gibraltar, calculating the length of the voyage and time of unloading as fifteen days, to be as follows: Insurance, $875; interest on cost, $750; depreciation, $625; crew, $580; provisions, $168; port charges, $184; plotage, $330; fuel, $2,025 (this allows fuel selling price for company's coal used for steam) and with $100 for incidentals, we have a total of $5,637, making a cost of but 80.4 cents per ton for the actual transportation of the coal. Vessel owners always like to secure and count upon a return cargo, and coal men owning such a vessel would doubtless get more or less freightage destined for the United States. But suppose that practically nothing could be secured; charge $1.50 as the rate of freight and it will be seen that American coal can then be laid down in Cardiff, placed in the very seat and center of the greatest coal industry in the world, at $4 per ton, $3 indeed below the selling price of the Welsh coal. It is not probable that any American producer would like to do business on such a narrow margin, nor would he derive any permanent gratification from wounding the sensibilities of the Cardiff producer to such an extent. Having invested largely in shipping facilities and ships himself, he would want to realize upon his investment, and, no doubt, after having taken for himself the customary margin of profit implied in a selling price of $2.50 at the loading port, together with whatever margin there might be in the assumed freight of $1.50, he would not hesitate to add $2 more to meet the contingencies attending the exploitation of a new business. That would be a profit ample enough to insure against any possible loss because of unforseen circumstances. On a cargo of 7,000 tons it means $14,000 margin, yet see in what an advantageous position that would place the American producer. At $6 per ton at Cardiff or an equally distant port, he would be $1 under the price of Welsh coal, or on an equivalent basis with Newcastle coal f. o. b. And we need not assume that the freight rate named carries the coal in the direction of Cardiff, but let us assume that it goes to South Africa or to South America; then the 3,000 miles which we have paid for places us at a point 5,000 miles from Cardiff, so that the Welshman has to meet a difference of $1 in cost and 2,000 miles of transportation.

THE COAL BUYERS OF THE WORLD.

"If political questions are settled satisfactorily South Africa will perhaps in time be a large coal consumer, and South America takes a large quantity even at the present date; but it is not expedient to count upon too much advantage because of fortunate location, for the fact is the principal coal consuming countries are in the northern hemisphere, and are, with the exception of Belgium, those to which large British exports are made.

"The exports of coal from Great Britain form, indeed, an excellent guide to the fields that the American producer expects to cultivate in the next few years. British statistics are carefully kept, and the official figures may be accepted as representing very nearly the exact business done to the several countries named. Perhaps a small percentage of the coal supplied to steamers in the foreign trade was sold at the port of destination, as that is a frequent occurrence, otherwise the figures represent the exact business done with the several countries named:

EXPORTS OF COAL FROM GREAT BRITAIN FOR THE TWELVE MONTHS ENDING DECEMBER, (GROSS TONS):

Countries.	Tons 1897.	Tons 1898.	Tons 1899.
Russia	2,015,525	2,195,067	3,397,791
Sweden and Norway	3,460,974	3,612,445	4,493,586
Denmark	1,879,182	2,045,768	2,051,423
Germany	5,042,781	4,711,370	5,059,666
Holland	947,235	931,134	1,277,792
France	5,697,792	5,710,113	6,863,887
Portugal, Azores and Madeira	683,002	741,623	755,365
Spain and Canaries	2,257,306	1,789,866	2,292,395
Italy	4,834,054	4,665,166	5,513,452
Turkey	554,355	510,683	490,688
Egypt	1,860,723	1,907,505	2,125,921
Brazil	1,046,075	1,010,109	967,778
Gibraltar	332,806	399,605	325,837
Malta	454,784	462,143	419,461
British E. Indies	589,016	658,716	863,177
Other countries	5,441,808	5,211,483	6,210,349
Total, gross tons	37,096,918	36,562,796	43,108,568
In addition, coal for steamers in foreign trade..	10,455,758	11,264,204	12,226,801

In comparison with such statistics as these our export figures appear small and inconsequential, yet they show a growth, and in that way must afford satisfaction to all interested in the American trade. For the fiscal year ending with June 30, they were as follows:

EXPORTS OF COAL FOR JUNE AND FOR TWELVE MONTHS ENDING WITH SAME.

	June, 1899.	June, 1900.	Twelve Months, 1899.	Twelve Months, 1900.
Exports—Anthracite	210,813	213,051	1,571,581	1,775,168
Exports—Bituminous	315,865	530,497	3,940,352	5,413,453
Exports shipped to—				
United Kingdom	.....	185	7,896	187
France	.....	28,981	1,011	55,317
Germany	.....	467	27	2,593
Other Europe	1,704	36,828	31,871	175,471
British North America	411,010	536,828	3,631,459	5,413,017
Central America and British Honduras	260	1,936	4,982	7,988
Mexico	40,044	58,165	450,813	645,204
Santo Dom	830	1	4,647	4,475
Cuba	30,859	20,884	357,368	336,306
Puerto Rico	.....	3,362	21,980	22,468
Other West Indies and Bermuda	18,605	30,551	224,208	256,629
Brazil	380	8,989	47,536	49,034
Columbia	4,904	25	14,082	17,643
Other South America	170	16,105	82,179	67,092
Hawaiian Islands	4,020	241	37,982	38,584
Other countries	309	.....	52,773	23,753
Philippine Islands	13,583	.....	44,700	64,419
Asia and Oceanica	.....	.....	36,469	8,441
Total	526,678	743,548	5,051,933	7,188,621
Coke, tons	27,797	26,185	215,513	363,202

"It must be remembered that these are the custom house figures of actual shipments, not even including the large item of bunker coal to steamers in the foreign trade. Many shipments arranged for which have since gone forward are, of course, not included in these returns, and no notice has been taken of negotiations which will soon result in actual business. It can safely be said that the returns for the second half of 1900 will far exceed those for the first six months. Now for something of foreign views of our coal, how it is regarded by the consumers abroad and what the chances are for introduction. This is a subject that the United States consuls have looked into, and in view of the fact that they are not practical coal men, it must be admitted that they have gone into the matter very thoroughly and given it careful, thoughtful attention that should meet with the approval and commendation of all interested in the progress of the American coal trade.

"The consuls in France in particular have devoted attention to this subject, and Mr. Skinner, our counsel at Marseilles, says: 'If we seriously take up and study the question of coal export as we have studied out processes for reducing the price of iron and steel by eliminating the half dozen commissions which, under the existing circumstances, go to middlemen, we shall overcome the several difficulties which exist, and Europeans themselves seem to feel that American enterprise knows no bounds, and that with illimitable coal areas to draw from the mere matter of a thousand or more of miles of ocean to traverse than our nearest competitor will not be permitted to interfere permanently with the expansion of our exports of coal.' Mr. Skinner in a recent report shows that the importations of British coal at Marseilles have developed from 246,000 tons in 1889 to no less than 828,000 tons in 1899, the growth being steady and to a certain degree uniform. 'No subject pertaining to industry and commerce has excited more interest in France during the last year than the question of coal, and the United States more than any other country,' says our counsel at Lyons, 'is looked to for the supply necessary to meet the increasing demand.' So, too, at Nantes, there is interest taken in American coal, and shipments have already been made to that port, a place which imports at present more than 1,000,000 tons of coal. La Rochelle, where fishing is the principal industry, is also interested in coal. Practically no French coal is used in that consular district, and the price of English coal having been very high, there has been a large correspondence on the subject of American coal. The fact that Havre is the principal port of France gives special value to the report of the United States consul at that place, and he says: 'Once a foothold is obtained, American ingenuity and tenacity of purpose would make our export trade a permanent one, one which will be of great value to our miners and shippers of coal, and one which should assume large proportions.'

FRANCE PRODUCES AND IMPORTS.

"In fact, as one of our consuls says: 'If the American coal dealers can convince the French consumer that our coal will produce the same amount of or more of steam per ton and can be placed on the French market at the same or a lower price than the English coal, the American will get the order, for the French do not buy English coals because they are mined in England or Wales.' France, it may be said, is the only country producing coal on a large scale which also imports coal to a

(Continued on page 25.)

STEAM TRIALS OF THE NEW ROYAL YACHT.

The new royal yacht Victoria and Albert has now completed her steam trials, and the official results are given in the appended table, which shows that in all respects the expectations have been more than realized. The yacht was designed by Sir William H. White, the director of naval construction, and was built at the Pembroke dock yard. The vessel is 380 ft. long by 50 ft. beam, and her displacement is 4,700 tons, with 350 tons of coal in the bunkers. Great importance was attached to her stability, and the stormy weather experienced afforded opportunity of testing it, and on all occasions with satisfactory results. In each engine there are four cylinders, the parts being balanced on the Yarrow-Schlick-Tweedy system. The high pressure cylinder is 26½ in. in diameter, the intermediate 44½ in., and two low-pressure cylinders 53 in., with a stroke of 3 ft. 3 in. The boilers are of the Belleville type, with economizers, and have 26,000 sq. ft. of heating surface, and 840 sq. ft. of grate area. The stoke holds are artificially ventilated, there being no cowls. The machinery was designed and constructed under the special direction of Sir John Durston, engineer-in-chief of the navy. The steam trials set by contract consisted of four runs, the first of 48 hours' duration, the next two, each of 48 hours' duration, at 7,500 I.H.P., and the fourth of 8 hours, at full power. The results of all four are tabulated.

RESULTS OF CONTRACT STEAM TRIALS OF THE ROYAL YACHT VICTORIA AND ALBERT.

	48 hours at 5000 I. H. P.	46 hours at 7500 I. H. P.	48 hours at 7500 I. H. P.	8 hours at full power.
Draught of water, forward.....	18 ft. 2 in.	18 ft. 2½ in.	18 ft. 2½ in.	18 ft. 2 in.
Draught of water, aft.....	20 ft. 1 in.	20 ft. 0 in.	19 ft. 11½ in.	20 ft. 1 in.
Steam pressure, lb.	254	268	272	306
Vacuum, in.	26.9	26.0	25.25	25.25
Revolutions	110.9	128.4	128.4	147.4
Indicated horse power.....	5142	7625	7649	11298
Speed over long course, knots.....	16.32	18.33	18.47	20.53
Coal consumption, lbs.	1.94*	1.94*	1.87*	.....

*For 40 hours.

The first trial took place on Aug. 9 and 11. As the yacht proceeded down channel she cleared the rain, but the wind increased in violence till at night it reached three-fourths of a gale. At this time the yacht was steaming between the Lizard and the Scilly islands to avoid the ordinary mercantile traffic and to be ready at daylight to get on the measured course off the Cornish coast. Twice during the night the course was altered, and the stability of the ship under trying conditions was thus fully tested. In running before the wind she was perfectly steady; against the wind she pitched, but her movement synchronized with the action of the sea; with the wind abeam she rolled, but even in turning the heel did not exceed 10 degrees, and the time taken in rolling from one side to the other was about the average of a well-found warship. At no time did the yacht dip her nose into the sea, but the spray was of such volume that the funnels for more than half their height remain coated with salt. On Friday morning, with a strong breeze still blowing, the yacht reached the measured course between Rame head and Dodman point, over which she made four runs. She had started with only twelve out of her eighteen boilers in use, but during Thursday night's run in the open sea three additional boilers were lighted up as a precautionary measure, and they continued in use for the remainder of the trial. The exact distance of the course is 23.2 miles, and the mean result of four runs gave the time as 85 minutes 25¼ seconds, or a speed of 16.3 knots. The pressure at the boilers was 256 lbs. and at the engines 237¾ lbs. The vacuum was 27.3 in. starboard and 26.75 in. port. The revolutions were 113.71 per minute. The engines and boilers gave as much satisfaction as the hull. With the exception of the capstans and boat hoists, all the machinery is below the water line and under the immediate observation of the engineer on watch.

The second trial, which lasted only 46 hours, owing to fog, was on Aug. 16 to 18. The weather was more moderate, and there was neither pitching nor rolling. Six runs were made over the measured course, the mean speed being 18.3 knots, the maximum with the tide being 19.6 knots. Vice-Admiral Sir John Fullerton commands the royal yachts and Rear Admiral A. K. Wilson, V. C., the controller of the navy, were present at this trial.

The third trial was on Aug. 23 to 25. A heavy sea, with ground swell, was running in the channel throughout the trial, but it had no effect upon the yacht, which, as on the last occasion, proved a thoroughly trustworthy sea boat. There was no perceptible vibration, and in the saloon it was difficult to realize that she was under way in a heavy sea. The mean results, it will be seen, closely approximated to those on the previous trial at the same power, the difference in indicated horse power being 24, but the coal consumption was rather better, probably a result of experience, being 1.87 lbs. instead of 1.94 lbs. in the two preceding trials. On the previous trial, at the same horse power, the speed averaged 18.33 knots; now it was 18.47 knots. With regard to indicated horse power it should be explained that, although the mean result is given there was very little variation from start to finish.

The full power trial was on Aug. 29, and it was in fine weather. The yacht drew 18 ft. 2 in. forward and 20 ft. 1 in. aft. The steam pressure at the boilers was 306 lbs. The vacuum was 25.2 in. starboard and 25.3 in. port; the revolutions 147.2 starboard and 147.6 port. The indicated horse power was 5,620 starboard and 5,678 port, and the collective indicated horse power 11,298. The mean air pressure was .6 in., and the mean of four runs over the measured course gave a speed of 20.53 knots. This being a full power trial, the coal consumption was not taken. On the 30th ult. the yacht carried out her circle, starting and stopping, and anchor trials.

Any doubts entertained as to stability have been entirely dissipated by the behavior of the yacht in two gales, when her speed did not fall off to an appreciable degree, while in a moderate breeze she was perfectly steady. Whether she has had to steam through a heavy sea or through smooth water the bow wave has been clean and regular, with a fine run from the stem to the midship section, and no volumes of water of weight have been thrown off from any part. Nor has there been any churning or thumping under the quarter, whether the ship has been traveling at her highest speed or running through a gale. Each trial also disclosed an absence of vibration over the propellers, while the tests that were made in the worst weather she encountered showed that the angle of heel in rolling did not exceed 8 degrees or 10 degrees. The hull and engines have thus answered all the requirements of the designers. In consequence of continued ill health Sir W. H. White, director of naval construction, was unable to be present, but the final trial was attended by Sir John Durston, engineer-in-chief. The vessel was in charge of Capt. A. A. C. Parr for the purposes of the trial. The admiralty was represented throughout the trials by Mr. H. J. Oram, senior engineer inspector, and Mr. J. Rogers, the constructor; Fleet Engineer W. H. Matthews represented the Portsmouth dock yard reserve, and Chief Engineer W. H. Beckett represented the chief engineer's department. Fleet Engineer J. M. C. Bennett was the chief engineer of the ship; the contractors of machinery, Humphreys & Tennant, were represented by Mr. Robert Humphreys.—Engineering.

WRECK STATISTICS FOR 1899.

The statistical summary of vessels totally lost, condemned, etc., just published by Lloyd's register (British), shows that during 1899 the gross reduction in the effective mercantile marine of the world amounted to 996 vessels of 783,508 tons, excluding all vessels of less than 100 tons. Of this total, 330 vessels of 469,621 tons were steamers, and 666 of 313,887 tons were sailing vessels. As regards steamers the present return exceeds the average of the preceding eight years by fifty-seven vessels and 124,730 tons; as regards sailing vessels it is below the average by 169 vessels and 68,579 tons. Similarly, the figures relating to steam tonnage owned in the United Kingdom are above the average, while those relating to sailing vessels are below. The excess in the case of steamers follows upon the great increase during recent years in the amount of steam tonnage afloat, and is partly attributable also to the amount of tonnage broken up, condemned, etc. Apart from cases which come within this latter category, the United Kingdom steam tonnage lost during 1899 exceeds the average of the preceding eight years by about 32,000 tons, while the tonnage owned has increased since 1891 by nearly 3,000,000 tons.

The summary exhibits interesting data as to the relative frequency of the different kinds of casualty which conclude the existence of vessels. Strandings and kindred casualties which are comprised under the term wrecked are much the most prolific cause of disaster. To such casualties are attributable 39 per cent. of the losses of steamers and 44 per cent. of the losses of sailing vessels. The next most frequent termination of a vessel's career is by condemnation, dismantling, etc.; about 21 per cent. of the vessels removed from the merchant fleets of the world are accounted for in this manner. Of the remaining causes of loss, collision is the most general for steamers (12 per cent.); while, for sailing vessels, the categories of missing (11 per cent.) and abandoned (10 per cent.) rank next in order of frequency. Cases of abandoned, foundered and missing vessels may perhaps be regarded as frequently more or less similar in the circumstances of loss. If these be taken collectively, they comprehend 22 per cent. of the losses of steamers and 26 per cent. of the losses of sailing vessels.

The return has been compiled by Lloyd's register in such a manner as to enable a comparison to be made between the percentages of loss suffered by each of the principal merchant navies in the world. Great as the absolute annual loss of vessels belonging to the United Kingdom appears to be, it is seen to form a very moderate percentage of the mercantile marine of the country, and to compare favorably with the losses sustained by other leading maritime countries. The merchant navies which exceed a total of 1,000,000 tons are those of the United Kingdom, the British colonies, the United States of America, France, Germany and Norway. Of these countries the United Kingdom shows the smallest percentage of loss, viz., 2.59 per cent. of the vessels owned; Germany follows with 2.8 per cent.; and Norway is the highest with 5.93 per cent. As regards steamers, while the percentage for the United Kingdom stands at 2.24, the average of the percentages of loss for the other five countries is 2.68. For sailing vessels, the other five countries show an average percentage of 5.88 as compared with 3.75 per cent. for the United Kingdom.

The percentages given at the end of the preceding paragraph suggest that steamers have a much greater immunity from disaster than have sailing vessels. This inference is sustained if the losses suffered by the remaining merchant fleets of Europe be also taken into account. While the losses of steamers amount only to 2.24 per cent. of the number and 2.38 per cent. of the tonnage owned, the losses of sailing vessels reach 5.38 per cent. of the number and 4.66 per cent. of the tonnage.

The statistics for the United States show that of the steam vessels one of 1,052 tons was condemned; four of 3,155 tons were burned; one of 698 tons collided; four of 2,214 tons foundered; one of 1,889 tons was missing; nine of 5,886 tons were wrecked; making a total of twenty vessels of 14,894 tons, a percentage of vessels owned of 3.31 per cent. and of tonnage owned of 2.78 per cent. Of the sailing vessels of the United States thirteen of 6,781 tons were abandoned at sea; five of 1,035 tons were condemned; four of 3,740 tons were burned; seven of 1,846 tons collided; seven of 3,051 tons foundered; three of 490 tons were lost; ten of 5,249 tons were missing; sixty-one of 28,404 tons were wrecked; a total of 110 vessels of 50,596 tons, making a percentage of vessels owned of 5.15 and of tonnage owned of 4.55. The grand total of American vessels lost is 130 of 71,728 tons, a percentage of vessels owned of 4.75 per cent. and of tonnage owned of 3.83. These figures are exclusive of vessels trading on the great lakes.

MEDALS FOR SHAW ELECTRIC CRANE CO.

Prominent among the representative machinery concerns of the country who have carried off high honors at the Paris exposition is the Shaw Electric Crane Co. of Muskegon, Mich., manufacturers of the celebrated Shaw three-motor electric traveling cranes for machine and railroad shops and ship builders' and boiler makers' use. Word has just been received by Manning, Maxwell & Moore, who are the sole sales agents of the Shaw company, with offices at New York City, Chicago, Pittsburg and Cleveland, that the international jury of award has awarded the Shaw company a gold medal in class 21, general mechanical apparatus, and a silver medal in class 23, electrical appliances for hoisting. The awards show a gratifying recognition of the superior merit of the Shaw cranes and bespeak an increased demand for them abroad.

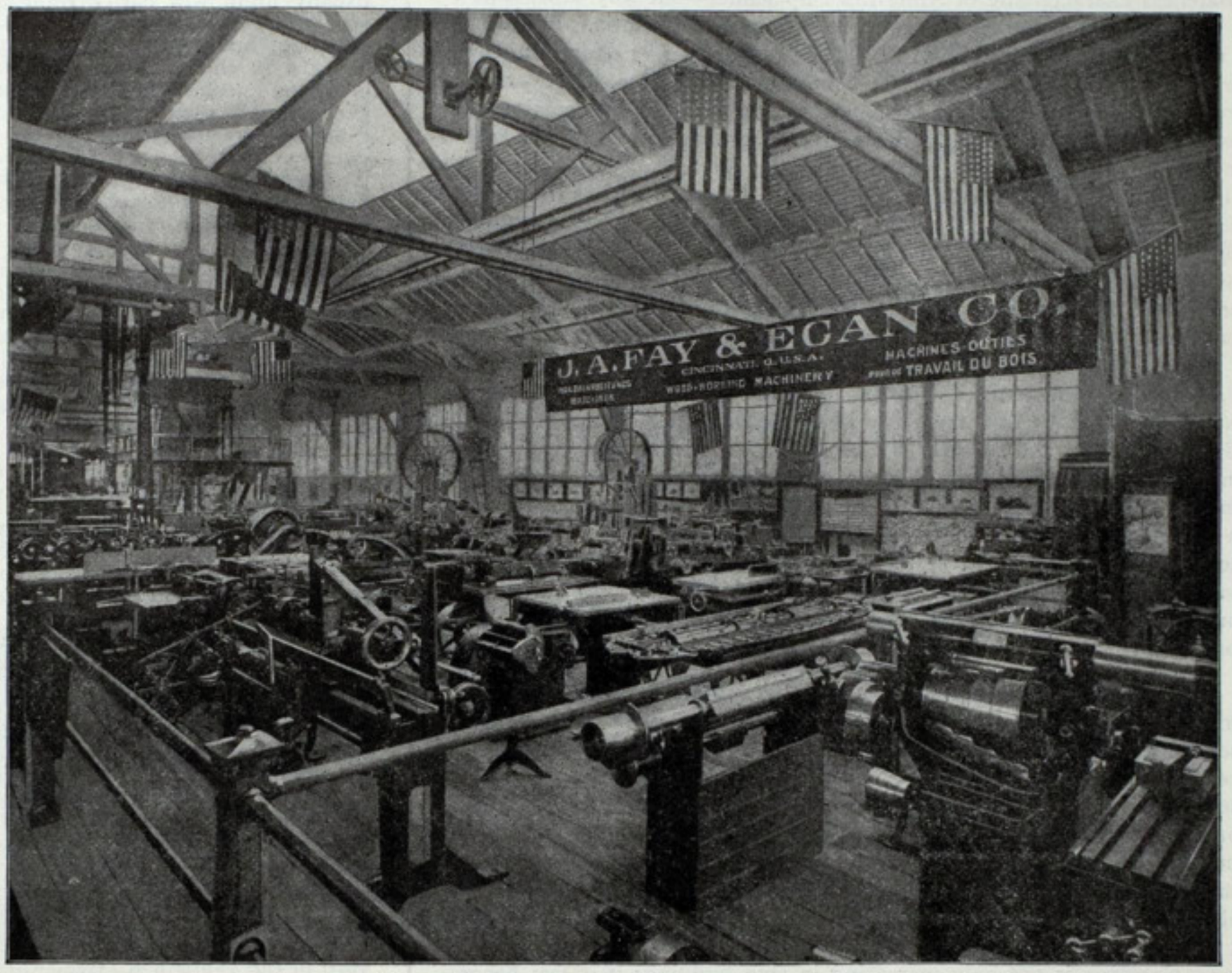
ANOTHER STEAMSHIP LINE CONTEMPLATED.

New Bedford, Mass., may have a regular steamship line to the Azores. As a heritage of the old whaling industry Bedford has the largest Portuguese colony in America, and probably the largest in the world out from under the flag. This fact and the long association has made New Bedford about the foremost port in America to the mind of the Azorites. Several sailing vessels have found a paying business in the past, though they are now withdrawn, and Boston capitalists think it can be built up with fast and commodious steamers. Accordingly a 2,000-ton passenger ship will be chartered and an experimental trip will be made, starting on Sept. 25. If it pays, it is proposed to continue the service regularly.

AMERICAN SUPREMACY IN MACHINERY.

It is well understood that the United States is unequaled by any nation in the world in the manufacture of labor saving machinery. Especial interest is therefore shown in machinery exhibits from Americans at the Paris exposition. Prominent in this line is the exhibit of the J. A. Fay & Egan Co. of Cincinnati, largest manufacturers of wood-working machinery in the world, who were awarded the grand prix, highest award given at the exposition. This is the third time this concern has been similarly honored. They received the same award at the Paris expositions of 1878 and 1899.

A view of the present exhibit of this company is presented herewith. It has attracted unusual attention on account of its completeness and the thorough manner in which the machines perform their work. It occupies the largest space of any foreign exhibit and contains a full line of machines for working and cutting wood in every manner, all in operation. The company's skilled corps of representatives explain workings of the different machines and illustrate what they will accomplish. Among the more important of the machines in the exhibit are a new band saw-mill and self-feed band rip saw with knife edge balance, patented Feb. 27, 1900; new triple-drum sand papering machine; planer with center-geared rolls hung pivotly, patented Dec. 19, 1899, Feb. 6, 1900, and May 8, 1900; spoke lathe with automatic lift to vibrating frame, patented Dec. 19, 1899; automatic gauge lathe; band re-saw, patented Feb. 27, 1900; new and improved methods of gearing; fixed knife planer, patented June 26, 1900; vertical car boring machines, patented Jan. 30, 1900, and Feb. 6, 1900; heavy double cylinder dimension planer, matcher and jointer, patented Jan. 9, 1900, and March 20, 1900; box board matcher, patented Dec. 19, 1899; circular saws, patented April 24, 1900; variety wood workers; lightning floorer, patented March 20, 1900; double-end tenoner, patented June 5, 1900, and many others.



Where so many excellent specimens are shown in the exhibit of one company it would be difficult to know which machine to describe, and lack of space prevents our going into their merits on an extended scale; suffice it to say, therefore, that J. A. Fay & Egan Co. is entitled to the highest praise for again upholding the prestige of the United States for superiority in this industry.

TANGLE WITH DRY DOCK CONTRACTORS.

It is entirely probable that the navy department will be able to straighten out the difficulties which have arisen with the contractors over the conversion of the dry docks at Mare island, San Francisco and League island, Philadelphia, from timber to stone docks, and be able to complete them within the limit of the appropriations. Originally congress appropriated $825,000 each for these docks, which were to have been constructed with timber, but subsequently the sum of $700,000 was appropriated to convert them into stone docks. The conversion necessitated considerable change in the plans, and the contractors who had secured the original contracts for timber docks figured out that the changes would increase the expenses of completing the docks far beyond the amount of the appropriation. A board of officers was appointed to examine the subject and reported that the estimates of the contractors were excessive. The contractors were then given an opportunity to be heard, and their statements have just been received at the navy department. Admiral Endicott, chief of bureau of yards and docks, is of the opinion that eventually the docks will be constructed within the limit of the appropriation. The work of constructing the docks has not as yet been interfered with. Only such work as is common to both of them, the excavation, the building of the cofferdam and so forth, is in progress. It may be that in order to keep the cost within the limit of the appropriation the department will be obliged to curtail somewhat the amount of granite used in construction.

It is seldom that funds collected for entertainment purposes are in part returned. Usually there is a deficit on such occasions. When arrangements were made a short time ago for the entertainment of congressmen, who visited the lakes with Chairman Burton of the rivers and harbors committee, an assessment of two-thirds cent a ton was levied upon all vessels in the Lake Carriers' Association. The congressmen were royally treated and still there is a surplus of $1,100 to be returned to members of the association.

WEEDING OUT ANTIQUATED SHIPS.

The question of naval defence is again seriously occupying the attention of the British admiralty, and the complete reorganization of the first reserve squadron will, it is stated in the service papers, be made next month. The more antiquated ships are to be weeded out and their places to be taken by vessels of more modern build and armament. At present the first reserve squadron is composed in part of the ships doing guard duty at the coast ports, some of them having been launched as far back as 1875. They number nine in all, five battleships and four cruisers. In addition to these there are the port guard ships and two cruisers used as drill ships for the naval reserve. The port guard vessels are battleships, five in number, making the whole squadron consist of ten battleships and six cruisers, representing very different types and belonging to varying periods in naval progress. Four of the battleships belong to the Admiral class, while two of the remainder are so nearly like them as to be looked on as similar ships. None of the unemployed vessels is of a type immediately to replace the others and add to the strength of the squadron, but as the newest ships take their places in the Mediterranean and channel squadrons, those ships displaced will be used to form the first reserve, the older vessels being put out of commission, and some of them broken up or sold out of the service.

As a consequence of the recent French naval maneuvers, the formation of a second reserve squadron is under consideration for independent service. This would really mean that there will be three distinct squadrons in British waters, one to serve as a squadron of reinforcement for the Mediterranean fleet; the channel squadron proper with its base at Portland on the Dorsetshire coast, and the third squadron for service in the North sea. At present there is a long list of vessels in the British navy that are of no practical use in modern war, on which it would be a waste of material to place modern weapons, and crews which would be better employed on other ships now undermanned. The only use of these antiquated craft is to make a fleet look formidable on paper, and to absorb resources in men and material that would be more useful if concentrated on newer vessels.

The Belleisle experiments, although not entirely satisfactory, proved that the older ships are practically useless against vessels armed with guns using shells charged with high explosives. Their retention in the category of effective warships therefore only tends to nourish illusions based on numbers rather than confidence founded on the quality of the vessels composing the navy, while it cannot deceive a possible enemy.

Mr. J. H. Macalpine, a promising young engineer, who feels grateful to Rear-Admiral Melville of the navy department for many kindnesses, dedicates to that distinguished officer an elaborate study on the "Inertia Stress of Elastic Gears," which has just been concluded in volume 12 of the Journal of the American Society of Naval Engineers. Rear-Admiral Melville is referred to as a distinguished engineer and explorer; Engineer-in-chief United States navy; LL. D., M. SC., Dr. Eng'g; gold medallist, by act of congress, for heroic service in the Arctic; honorary member of the Royal Swedish Society of Anthropology and Geography; Institution of Naval Architects, Great Britain; Franklin Institute, Philadelphia; American Society of Civil Engineers; American Society of Naval Engineers; past president, American Society of Mechanical Engineers; vice president, Society of Naval Architects and Marine Engineers of the United States; member of the Military Order of the Loyal Legion of the United States; of the general council of the general commandery, Naval Order of the United States; Grand Army of the Republic; National Geographical Society, Washington, D. C.; National Academy of Sciences, Washington, D. C.; Philadelphia Academy of Sciences, etc.

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"The new United States submarine boats will be a trifle larger than the Holland. They are to be named Adder, Grampus, Mocassin, Pike, Porpoise and Shark. With some of the names there is that poetic appropriateness characteristic of American ship names—but why Mocassin?"

The above is a paragraph from the Engineer of London. For a while it made us stare most mightily. If Adder is allowed why should Mocassin be singled out as an inappropriate name for a submarine destroyer. But presently the reason dawned upon us. It is a part of the charming confusion which obtains in England regarding a great many American names and conditions. Assuredly the writer of the above paragraph has in his leisure moments been a reader of Fenimore Cooper and has drank deep of the fiction of prairie and range. Mocassin to him is merely an Indian slipper, and of course he did not understand why the navy department should name one of its boats after an old shoe. He does not know that mocassin is also the name of the most venomous of American water serpents, and is certainly a fitting name for a death scattering submarine. If there is any inappropriateness in the names it is that of Adder which is a miserable little runt of a shrubbery snake. However, there is a fish known as sea-adder and there are two British torpedo boats known as Viper and Cobra, and so we'll let that pass with the assertion that Mocassin is the most appropriate of them all. We are reminded of the little English girl who asked a visiting American if the United States were not an extremely dangerous place to live in, as she had been informed that there were rattlesnakes in nearly everyone's yard. Upon being assured that no condition of the kind existed she declared that her uncle had counted forty wigwams in a single village, but she naively added that possibly wigwams were not considered as deadly as rattlesnakes.

Meet an Englishman in Africa and he will rail about the "beastly tariffs" wherewith the French surround any little patch of earth of which they may be possessed; for the right of unrestricted trade has been bred in his bone. Meet him in any of the colonies and he will rail at the cheap and shoddy stuff that the Germans send into the market to compete with English goods. There was some justice in the latter contention until now. Recently things have been changing. Germany has ceased to be contemplative and has become constructive. With the development of its practical side it has improved its manufactures. "Made in Germany" has become the stamp of approval and not of condemnation. Germany is not only increasing in ship building; it is fast becoming a great manufacturing nation. The manufacture of iron and steel is usually an index to a nation's greatness. The production of steel in Germany in 1880 amounted to but 624,418 tons. In 1899 it was 6,290,434 tons—a ratio of increase which surpasses both that of the United States and Great Britain. Ten years ago Germany was an importer of glassware; today she is an exporter. Moreover she is obtaining the ships to carry this commerce abroad.

Recently while the Oregon was being temporarily repaired at Kure so many of the crew deserted that Capt. Wilde, commanding the ship, requested the Japanese authorities to assist him in apprehending them. Meanwhile Naval Constructor Thomas F. Ruhm was on his way to Hong Kong to relieve Naval Constructor Hobson. He was intercepted by orders to superintend the repairs to the Oregon. No sooner had he set foot on Japanese soil than he was promptly arrested. As he was unable to speak Japanese and as the policeman could not speak English, he was unable to determine the cause of his arrest; and to all his entreaties and expostulations received only the mute answer of a significant tap upon his uniform. He was hustled before a magistrate by the triumphant policeman, who denounced him as a deserter from the battleship Oregon. Naval Constructor Ruhm managed finally through an interpreter to explain his mission, whereat the magistrate profusely apologized for the zeal of the constable and took the constructor out to dinner.

The present congress at its first session granted authority to the navy department to assign retired officers to active service when, in its opinion, their mental and physical condition warranted it. So far the navy department has seen fit to return only five men to active duty and only two of them to sea duty. One of the admirals at least, Melville, has set his foot down upon the return of any retired men to his department at all. He evidently holds that the world is moving at so fast a pace and that science has added so much to the equipment of the marine engineer that one who has been out of active service for any length of time is obsolete. Meanwhile a respectable army of retired officers are complaining that the department does not take advantage of the new authority bestowed upon it by congress.

STEEL EXPORT TRADE.

Carnegie will build a railroad from Pittsburg to tide water and Carnegie will build a fleet of steamers of Canadian canal dimensions, so as to secure freight charges on exports of steel that will admit of competition with foreign manufacturers. These are reports heard repeatedly from Pittsburg of late. As yet these statements are simply of a newspaper kind, but they are based upon a condition of affairs regarding our exports of steel that may soon result in radical measures on the part of the manufacturers. These reports show that not only the Carnegie company but the several other large steel producing concerns as well are badly hampered in their efforts to develop a large foreign trade by high rail freights between the mills and tidewater points, and also, just now, by higher ocean freights than prevailed some time ago when prices of steel in this country were so low as to open up foreign markets for a fairly large business. The matter of ocean freights, which are now unusually high, will partly right itself in a short time, although a final settlement on a much lower basis must be left to development of our own shipping, but it is the rail charges to tidewater that are of immediate concern to the steel manufacturers. They are again down to a range of prices on steel products at which a large foreign trade had been expected. All their plans of strong organization and great producing capacity were to lead up to large exports on the present low cost of production, but now they are asked to pay about $7.50 a ton freight to Liverpool, as against a rate of $4 which they secured on some of their first export business about three years ago. A very large part of this increase is in the rail charge to tidewater. The threatened construction of vessels to carry steel from the lakes across the Atlantic by way of the St. Lawrence is not a practical scheme, on account of the limit of lock dimensions in the Canadian canal; neither is it probable that Mr. Carnegie or any of the other leaders in the large steel concerns would undertake as yet the construction or purchase of a long line of railway to the seaboard in order to carry out their plans for securing foreign trade, but their efforts of the past two or three years, all shaped in the direction of foreign markets, will not be given up on account of the embarrassment they are now meeting with in freight charges. The problem will be solved.

KEARSARGE AND ALABAMA—NORTH AND SOUTH.

Owing to the unfavorable weather Monday the unveiling of the tablets presented by the state of New Hampshire to the battleships Kearsarge and Alabama was postponed until Tuesday afternoon, when a clear sky and warm sun made agreeable the September day. The exercises consisted of an address of welcome by the Hon. E. E. McIntire, mayor of the city, an address by the president of the day, the Hon. Chas. H. Burns of Wilton, and the unveiling of the tablets. Miss Mary Thornton Davis, daughter of Judge Charles Thornton Davis of Boston, and grandniece of James Thornton, executive officer of the old Kearsarge, uncovered the gift to the Kearsarge, and Mrs. Bryan, daughter of Admiral Semmes of the Confederate navy, unveiled the tablet presented to the Alabama. The formal presentation was made by Gov. Rollins and the speeches of acceptance were made by John D. Long, secretary of the navy, and Gov. Joseph F. Johnston of Alabama, the former accepting the Kearsarge gift and the latter receiving the Alabama. Sentiments of reunion of north and south in the speeches were applauded vigorously.

ITEMS OF GENERAL INTEREST.

The torpedo boat destroyer Decatur will be launched from the ship yard of the William R. Trigg Co., Richmond, Va., on Wednesday next.

Matthew Turner, San Francisco, Cal., is building a pilot boat to take the place of the Bonita. The vessel will be 93 ft. 6 in. over all, 81 ft. load water line, 24 ft. beam, and 9 ft. 8 in. draught. It is expected that the vessel will be launched about Dec. 1.

All shipping men acquainted with Glasgow and its habor steamers will be interested to learn that T. B. Leath & Co. of Rutherglen, builders of the famous Cluthes, are now designing and are to build new passenger steamers for the improved harbor service which is to be inaugurated.

The Union Steamboat Co., to engage in transportation business, has been incorporated at Augusta, Me. The authorized capital is $100,000 and the incorporators are Frederick D. Gallupe, John B. Durpee and Charles Lewis, all of Boston. The principal office of the company will be located in Kittery, Me.

The four-masted steel barquentine Hawaii has been launched from the yard of A. McMillan & Son, Ltd., Dumbarton, Scotland. She is being built to the order of Hind, Rolph & Co., San Francisco, and is their first venture in steel ships. She has a tonnage of 1,080 gross and is 206 ft. long, 42 ft. 3 in. wide and 19 ft. 5 in. deep, and has large sail spread and modern equipment.

Following are the names, places of construction and contract time for the completion of the six submarine boats lately authorized: Adder at Lewis Nixon's ship yard, Elizabeth, N. J., 8 months; Grampus at Union Iron Works, San Francisco, 8 months; Moccasin at Lewis Nixon's, 9 months; Pike at Union Iron Works, 9 months; Porpoise at Lewis Nixon's, 10 months; Shark at Lewis Nixon's, 11 months.

At the meeting of directors of the Carnegie Steel Co. on Tuesday last the resignation of A. M. Moreland as secretary and director of the company was accepted. William W. Blackburn, assistant treasurer of the company, was chosen to fill both vacancies. W. C. McCoslin, cashier of the company, was appointed to fill the vacancy caused by the promotion of Mr. Blackburn, and Frank A. McCune was appointed cashier to fill the vacancy caused by the promotion of Mr. McCoslin.

The board selected by the secretary of the navy, under the provisions of the current naval appropriation act, to examine the expediency of changing the naval station at Port Royal to some point near Charleston, S. C., has, as yet, reached no decision. Admiral Rogers, who is president of the board, says that the board needs some further information, which must be obtained before the decision can be made. It is believed that the data which the board is awaiting relates to prices of certain sites at Charleston.

A WARNING AGAINST OVERLOADING.

Buffalo, Sept. 19.—The late storm from the Gulf coast, though it did less damage than it might easily have done, as it broke the September record, has cost the insurance companies all told about $110,000, so we find the underwriters congratulating themselves instead of complaining over what would usually be considered a big item at this time of year.

What we do hear, by way of a sort of echo, taken up, as it is, time and again after there is loss of vessels by foundering, is the confident assertion that foundering nearly always comes from overloading. I do not hope at this time to be able to say much that is new on the subject, though sometimes it appears that a warning repeated without variation. if made at the right time, has a salutary effect. It must be that vessel owners are given to taking really more chances than they are quite aware of. The confident report comes in, for instance, that of the vessels that were lost in the hurricane of last week Tuesday, one was not only uninsured, but was loaded 2 feet deeper than she was built to load. We are by no means saying that such is the fact in this case, for there is too much temptation to round out a fairly good story by some overstatement, but we are prepared to fall back on the statement of a leading underwriter, made while reviewing the case, that at least nine-tenths of the older class of lake vessels load deeper than is consistent with their seaworthiness.

It may possibly be said on the other side that it is an easy matter to make such a sweeping charge, for it costs nothing. An insurance agent is not getting so much a ton extra out of a cargo because it is made as heavy as the owner thinks safe, and when he will take such chances on a vessel that is not insured it is good evidence that he has made some close calculations on them. Still it will have to be admitted that the insurance agent is much the better judge of things of this sort, for he has the cold facts driven home to him so many times during his delving into insurance losses that he cannot very well be mistaken. This subject would be much more easily disposed of if only property was involved, but a foundered vessel usually means a long list of people drowned, none of them, as a rule, at all responsible for the disaster, which quite likely the more experienced of them knew was more than likely to happen if there should be a heavy gale come up on the trip. It is herein that the terrors of the situation make their appearance.

A few days ago I was talking with Capt. Estelle of the canal schooner Reuben Doud, now doing her twenty-eighth season, with practically all the others of her class gone to the bottom of the lakes. I told him that experts had about come to the conclusion that the canal schooner was about as good for a storm as anything. Recent events especially had shown that the big steamers were not by any means indepedent of lake gales. The stalwart skipper replied that they were right. "There is nothing that will stand a big sea better than a canal schooner, if she is not overloaded. That is the whole secret."

The captain referred to some of his experiences in vessels of that size. Once he had come from Bar point to Buffalo in the schooner Unadilla in nineteen hours, merely running before the gale and carrying all the canvas that was safe. If the vessel had been loaded down till the seas buried her every time they passed her, she would never have made the trip, he was careful to say. Then he recalled the last trip of not a few other canal schooners—the C. B. Benson, that carried Capt. Duff down with her, one of the best sailors of his day, who had taken the schooner to salt water and back. Then the foundering of the George C. Finney came up, with the loss of Capt. Reardon and his crew along with her. There are more of them, practically all due to overloading, we are told; and not a few, as now, going down without insurance, so used are we to taking chances beyond what is prudent, especially as the season grows late.

An insurance wrecking master said, not long ago, that he had just inspected a vessel that was loaded so deep that the water came upon her deck even when no seas were running. Possibly, as I noted at the outset, the calling attention of owners to this common abuse will be the saving of some good craft yet this fall. If so, though nobody will ever be quite sure of it, this article will not have been written in vain.

JOHN CHAMBERLIN.

REPORTS FROM LAKE SHIP YARDS.

It was said, a few days ago, that officials of the American Ship Building Co. were considering the advisability of establishing another yard at some point on Lake Erie where the hulls for two or three new vessels could be built, in view of the crowded condition of the several yards now in operation. The different works of this company devoted to the construction of engines and boilers will also be crowded to their fullest capacity, but it was said that arrangements could be made to have machinery orders sublet to outside concerns. If such a project is contemplated, officials of the consolidated yards are as yet unwilling to give out any information regarding it. The American company has finally concluded arrangements with the Pere Marquette Ry. Co. for the large car ferry that has been under consideration for some time past and it is also understood that they have still another order from Detroit parties for a steamer of Canadian canal dimensions. This brings the list of new vessels under order with this company for delivery next year up to twenty-one. The new car ferry, to cost about $360,000, will be more powerful than the steamer Pere Marquette, which was built by F. W. Wheeler in 1896, but otherwise she will be a duplicate of that steamer, which is the best vessel of her class on fresh water. The new boat will be 338 ft. keel, 350 ft. over all, 56 ft. beam and 36½ ft. molded depth. She will have a capacity for thirty-two cars, and when loaded she will run at the rate of 14 miles an hour. She will have twin screws and two triple expansion engines. Steam will be furnished by four Scotch boilers. She is not to be completed until October of next year, and it is therefore thought she will be built at the Globe works, Cleveland, but there is nothing definite on this score as yet.

The steel propeller, Howard L. Shaw, built by the Detroit Ship Building Co. for the Eddy-Shaw Transportation Co. of Bay City, was launched last Saturday afternoon. Her name is that borne by the manager of the fleet of six big steel propellers owned by that company. The Shaw is, with one exception, a duplicate of the Simon J. Murphy, built at the same place for the same people and completed earlier in the season. That exception is one more stateroom forward for guests than is carried by the Murphy. The new steamer is 455 ft. over all, with 51 ft. 6 in. beam, and a molded depth of 28 ft. 6 in. Her propelling power will be a triple expansion engine with cylinders 22, 35 and 58 in. in diameter, with 42 in. stroke, fitted with two Scotch type boilers, 12 ft. long and 13 ft. 2 in. in diameter. It is calculated that 1,500 H. P. will be developed at 165 pounds steam pressure and 85 revolutions of the wheel in a minute. The propeller is 13 ft. 10 in. in diameter. There are three spare staterooms, with a double and single berth in each and a large sitting room. The equipment includes, of course, an electric light plant and all other modern appliances of the kind found on the best freighters of the lakes.

Superintendent G. A. Burwell with Messrs. John G. Perrin, John Hubbell and Louis St. John of the Lozier Motor Co., are making the trip from Toledo to Plattsburg, N. Y., where their new works are to be established, in a cabin launch that is propelled by one of the Lozier machines. About $300,000 is to be invested in the Plattsburg works at once, and it is contemplated that the plant will shortly be much larger than that for which contracts are now being let. Temporary quarters for the Lozier company, pending the completion of the Plattsburg works, have been secured in the establishment of a sewing machine company at that place. More than 200 Lozier engines for different types of pleasure craft have been built during the past year.

Arrangements are being made by the Chicago, Saugatuck & Douglas Transportation Co. for the construction at Saugatuck, Mich., during the winter of a wooden steamer to run between Milwaukee and east shore points on Lake Michigan in freight and passenger trade. The steamer will be of about 175 ft. length.

Another steel steamer of Canadian canal dimensions for Atlantic coast trade, the Waccamaw, has just been launched by the Craig Ship Building Co. of Toledo. This is one of the vessels built to the order of J. L. Crosthwaite of Buffalo for a special lumber trade on the coast. A duplicate steamer for the same interest is nearing completion at the works of the Union Dry Dock Co., Buffalo.

Quite a large repair job on the steel barge Maida of the Minnesota company's fleet was completed at the Lorain yard of the American Ship Building Co. on Monday. The work included twenty-six new frames and twenty-three plates.

AROUND THE GREAT LAKES.

Timothy Sammons, well known to vessel men as superintendent of the Rock Island grain elevators, Chicago, died at his home in that city, Tuesday, of Bright's disease. He was connected with the Rock Island elevators for thirty-five years.

Mr. J. C. Gilchrist of Cleveland has been informed from Boston of the loss of the wooden schooner S. L. Watson. She foundered off Cape Cod on Tuesday last. The Watson is one of the old lake vessels that were taken to the coast two years ago.

Ray G. MacDonald, who for the last three years has been associated with C. E. Kremer in the practice of the law, has fitted up new offices at 618 New York Life building, Chicago. He intends to make a specialty of maritime law matters. His card appears in this issue.

President P. W. Clement of the Rutland Transit Co. (Ogdensburg line) makes the following announcement from Rutland, Vt., under date of Sept. 10: "Mr. J. G. Westbrook having resigned the position of general superintendent of this company, Frank Owen will assume, pro tempore, the duties of that office. Address Ogdensburg, N. Y. Effective this date."

A dividend of $12.50 per share was declared by the Chandler Iron Co. last week. This is the second dividend declared by this company this year. The total, therefore, in dividends in 1900 is $25. The first dividend of $12.50 per share was paid last February. In this connection it is stated that payments in dividends by the Chandler Iron Co. within the last five years amount to $58 per share.

Although the Barry Bros. of Chicago do not consider it advisable, in view of the prices that are charged for new vessels, to as yet have a couple of steamers built for the Chicago-Muskegon freight and passenger trade in which they are engaged, it is more than probable that they will manage to charter or purchase, before next season, at least one vessel of greater capacity than they now have.

Robert W. Linn, whose death was announced from Detroit on Sunday last, was among the pioneer ship builders of the lakes. He was a member of the firm of Linn & Craig. Their works were located at Gibraltar, Mich., and many an old wooden boat that battles the waves today was built under Mr. Linn's direction. He was alone in the business for many years. Then he was joined by Mr. Craig as a partner. When the firm dissolved and Mr. Craig went to Toledo, Mr. Linn continued the business alone. The last launch took place about eight years ago, and when the steel vessels began to displace those of wood, Mr. Linn retired. He was born in Scotland seventy years ago.

The two wooden vessels sunk on Lake Erie during the severe storm of last week (steamer Lyon and schooner Dundee) may as well be counted among the ships that are gone for good. The Lyon undoubtedly went to pieces in sinking. Vessels have, of course, been raised from greater depth of water than that in which the Dundee is buried, but great difficulty is always encountered in removing an iron ore cargo from a sunken ship, and then, too, the Dundee is in the open lake where wrecking operations in almost any season of year must necessarily be slow and very expensive. Circumstances connected with the drowning of the crew of the Lyon were especially distressing. A deck hand who was saved says that while the mate and several of the men were in the hold cutting drains in the ore to carry the water aft, the captain went to the engine room to give orders for a full head of steam to beach the ship, which was already laboring heavily, with her decks giving way under the tons of water that had been taken aboard on account of inability to cut away the bulwarks. The captain was hurrying forward from the engine room, just before the ship disappeared, and the deck hand says he saw him at the final moment fall through the deck, which broke under him, into the hold where the mate and his men were already drowning.

The torpedo boat Barney, building at the Bath Iron Works, Bath, Me., for the United States government, was given a most successful 25-mile run recently on the Kennebec river between Bath and Parker Head. This was the first trial and everything worked perfectly. The work of preparing the boat for the official trial will be pushed rapidly. The performance gave abundant proof that she would exceed the contract speed of 28 knots.

BEST TYPES OF WAR VESSELS.

ESSENTIAL REQUIREMENTS AND CHARACTERISTICS OF FIGHTING SHIPS FOR THE BRITISH NAVY—NAVAL PRIZE ESSAY BY MAJOR C. FIELD.

In the current issue of the Journal of the Royal United Service Institution is published the naval prize essay by Major C. Field on the subject "The Best Types of War Vessels for the British Navy." The author reviews at length the lessons of the Chino-Japanese and Spanish-American wars, which, slim as they were, still contain some points of value. He summarizes these points as follows: The removal of woodwork; the necessity of providing thorough protection for the guns' crews; the fact that armor plating has shown itself more effective than had generally been supposed; the uselessness, not to say danger, of lightly-armored gun shields; the suicidal nature of the custom of mounting torpedo tubes above water; the comparatively slight effect of the heaviest guns when their cost, weight and slowness of fire are considered; the very great value and efficiency of quick-fire cannon, especially the heavier classes of weapon; the importance of homogeneity in a fleet or squadron. Rear Admiral Hichborn, chief of the bureau of construction and repair, has hitherto pointed out several of these lessons in articles and interviews in the Review and they are now being observed in the new program of construction for the American navy. Getting down to the pith of his subject, Major Field says:

"Having glanced, however cursorily, at the lessons to be gathered from the events of the Chino-Japanese and Spanish-American wars, it is now necessary to consider what types of vessels these point to as being most suitable to the needs of the British empire. These needs are many more than those of any nation under the sun. For on what navy falls the variety of duties and responsibilities that devolve on our own? In war, first and foremost there are the battleships of the enemy to be sought, sunk and destroyed, or if they seek shelter in the nowadays almost invulnerable recesses of their well-defended naval ports, on the navy falls the duty of preventing their escape into open waters without being brought to action. Our enormous floating trade, coming and going to and from all the ends of the earth, must, so far as is humanly possible, be protected from the attacks of the roving cruisers of an enemy that are sure of inflicting some loss, owing to the world-wide target presented by our commerce. Nor is the monetary loss, which must inevitably be the consequence of these attacks on this vulnerable point, the only danger to be guarded against. Far more important is the ensuring that a sufficiency of food stuffs and cereals to prevent famine reach Great Britain from the various pastures and granaries of the world.

"This work is the special duty of our cruisers, but in addition a proportion of them must attend our fighting squadrons. The 'eyes and ears of a fleet' cannot be dispensed with. Wherever our battleships go, their scouting cruisers must go too. In peace time, too, it falls to our ships to give ocular demonstration of the powerful and far-reaching arm of Great Britain. Powerful fleets must be ready to put in a timely appearance to second the various moves of diplomacy by what are generally termed 'naval demonstrations.' In the far-off corners of the earth also our colonists and settlers have to be protected against the attacks of savage tribes and the scarcely less savage officials of the small sultanates and republics that abound in out-of-the-way quarters of the globe. We cannot afford to scatter our finer cruisers, let alone battleships, broadcast on these duties, so it is necessary that we should have a class of smaller, cheaper and less well armed cruisers and small craft for what may be termed 'police duties,' which in war with another naval power would not be of any very great use in the progress of hostilities. The torpedo now being a recognized instrument of naval warfare, we of course cannot ignore it, and so must provide our fleets with a contingent of torpedo boats for the purposes of attack, and of torpedo boat destroyers to assist in defending our own fleets from this danger. How far, then, are our present types suitable for the numerous duties we have just indicated?

"Speaking generally, it may be admitted at once that our later types, at any rate, approach very nearly to the ideal. The older types, it is obvious, cannot be expected to be well adapted to meet the various exigencies of naval warfare of today, as since they were built the progress of naval construction, not only at home, but abroad, has progressed by leaps and bounds, so that they may almost be said to be out of the running. Possibly, though, a certain number of them might repay some expenditure in new engines and armament with a view to fitting them for special duties. For the modern ships of our fleet we are able to claim that in sea-going and sea-keeping qualities they are second to none afloat. No men-of-war belonging to foreign powers carry such ample supplies of coal, stores and ammunition as do our own; in no navy in the world is there the same homogeneity in the various classes of war vessels. The advantage of this last factor can hardly be overestimated, though strange to say it seems only lately to have been grasped by our rivals abroad, who up to quite recently have devoted all their energies to striving to produce a single ship of more than ideal perfection. The result of this system is that most foreign navies consist of ships of widely differing types not well fitted to fight or act in unison. This point has received but little accentuation from the events of the two recent naval campaigns, but, as we have seen, the disadvantages of fleets so composed were indicated to some small extent at the Yalu action. On the other hand, the advantages that an admiral commanding a squadron of ships that steam at equal speeds, can turn together through similar angles, and concentrate their fire on similar bearings, do not need demonstration. It would even seem possible that by rapid maneuvering when opposed to a fleet of heterogeneous battleships, he might succeed in throwing them into hopeless confusion and destroy them in detail. Another strong point about our modern ships is the similarity of their armament. The similarity between our cruisers and those of foreign powers is not so great, but then it must be remembered that they are built with a different object. The first duty of our cruisers, as a class, is to defend our commerce. Foreign cruisers—almost without exception, in some countries—are built to attack it, and so are constructed either with a view to speed alone and with only sufficient armament to overawe a merchant steamer, or else heavily armed and armored in order to contend at an advantage with our own, which, necessarily, from the extent of their sphere of watchfulness, have before all things to be designed to carry an ample supply of coal and to have superlative weatherly qualities. But it will be as well now to consider our present types a little more in detail, and then endeavor in each case to suggest a type for consideration as most suitable for the British navy.

BRITISH MODERN TYPE OF BATTLESHIP.

"Our modern type of battleship may be defined generally as a ship of from 12,000 to 15,000 tons displacement and 17 to 18 knots speed. Her principal armament consists of four heavy 12-in. (in the Royal Sovereign class 13-in.) guns mounted in pairs in strongly armored positions on the center line of the ship, so that one pair can fire dead ahead, the other dead astern, and both pairs on either broadside. Her secondary battery consists of ten to twelve 6-in. quick-fire guns, each in separate armored casemates, having moderately thick armor in front and thin plating on the inner sides. Her auxiliary battery is composed of a large number of 12 and 3-pounder rapid-firing guns, unprotected except by light shields attached to their mountings, a protection, by the way, that, to judge by the results experienced in the two recent wars, they would probably be at least as well without. Their flotation is protected by armored belts of from 6 to 18 in. in thickness, from the lower edges of which spring arched armored decks, so that practically a double cuirass is presented to the blows of an enemy's projectiles. Although there is a great apparent difference between the 6 in. of the side armor of the Canopus class and the 18 in. of the Royal Sovereign, the protection afforded in each case is not to be judged by inches alone, as the improved methods in the construction of armor go far towards equalizing it. There is no room within the scope of this essay to go into all the numerous important and less important differences between the Royal Sovereign, Majestic, Renown, Canopus, Formidable and Cornwallis types (the latter now under construction). It may be granted that the above general description applies to the whole set, and is the type to which we trust to maintain our supremacy at sea against any who may challenge it in the near future. As we have already pointed out, the design is undeniably a good, nay, an excellent one, and well suited to the British navy, which from necessity and tradition, must always expect to fight at some distance from our shores, and to which, therefore, seaworthiness, fair speed and good coal supply are indispensable. The only points that may perhaps be open to criticism are the amount of protection afforded to the 6-in. guns, their comparatively small number when the tonnage of the ship is considered, and the unarmored ends. This latter weakness has been to a great extent eliminated in the later ships, in which, forward of the citadel, there is a wide belt of 2-in. armor which reaches to the ram and descends even below it. The after portion of the ship is still dependent on the armored deck for its protection.

"The casemate system for the protection of the secondary batteries, though it has a good deal to recommend it, yet in reality only protects effectually the guns on the side next the enemy. A projectile which passes between two casemates, unless it strikes directly at right angles to the center line of the ship, will in all probability pierce the thin 2-in. armor of a casemate on the opposite side of the deck and burst inside with the deadliest effect. Would it not be better to return to the continuous plating of the battery?—which would not make much, if any, addition to the weight of armor, as the extra space to be covered by the 6-in. plating would be less than the area of the sum of the inner sides of the casemates, and it would be even better to take the additional risk of placing the guns somewhat nearer together if there was no other way of economizing weight. 'The casemate system invites the destruction of everything on the main deck; funnels, air shafts, ammunition tubes and communications can be ruined, the upper deck blown up and its armament disabled, and the casemates themselves destroyed from the rear. It is obvious that isolation can be carried out much more cheaply behind side armor.' But to come to our subject, what is the best type of battleship for our needs? In spite of the very plausible arguments of a considerable number of critics, it seems that however well smaller ships may suit the needs of other navies, we ourselves must have big ships having displacements of not less than 12,000 tons. They, of course, cost more to build than smaller ones; perhaps, roughly speaking, five 9,000-ton ships might be built for the price of three of our latest monsters; and when we are confessedly committed to a policy of blockading our possible enemies in their ports, numbers are very necessary. It is proposed then that we construct none but big first-class battleships, our second and third classes being provided from those of the first class that become, so to speak, superannuated by the progress of time and invention. The suggested type is described below:

DESCRIPTION OF THE PROPOSED BATTLESHIP.

"Our proposed battleship is from 12,000 to 15,000 tons displacement, and in general arrangement below the water line conforms to the Formidable type. The armor protection, however, is differently distributed. The main deck of 1-in. armor and the turtle back of 2 and 3-in. plating, remain the same. The 15 ft. width of the 9-in. partial Harveyized steel belt is reduced to 8, and the belt made complete, though tapering to 6 in. in thickness when near the bow and stern. This arrangement so far gives us a small balance of weight in hand, especially when the saving of some of the 2-in. bow armor is taken into consideration. But when 6-in. armor above this, from barbette to barbette to the height of the upper deck, is added, it will be the other way. This it is proposed to meet partly by the abolition of the interior sides of the casemates, and partly by removing one heavy gun from each barbette, thereby saving the weight of the gun itself and its ammunition, and reducing the weight of the barbette and hood, which could be made considerably smaller, while the same thickness as in the Formidable is maintained. The four casemates at the corners of the upper deck battery are, in this design, replaced by the same number of small turrets placed in a nearly similar position, and having a frontal thickness of 6 in., which tapers to 5 in. at the rear.

"Now for the armament. As we have seen, the four 12-in. guns are reduced to two. The reason for this radical change is found in the very poor return which the biggest guns have hitherto made for the great weight imposed on the ship carrying them by themselves and their protective armor. In the secondary battery the eight 6-in. quick-firers on the main deck are replaced by the same number of quick-firing 8-in. guns, while the four small turrets on the upper deck are each armed with a pair of 6-in. weapons. The one objection that, more than all others, would appear to be most pertinent to the proposed arrangement, is the multiplication of different kinds of ammunition, but it is submitted that

the record of the American 8-in. guns in the war with Spain justifies the change. The 12-pounder guns, at present without protection except that afforded from a raking fire by the casemates at the corners of the upper deck, are too valuable to be so exposed to destruction. As at present placed, the chances are that there would be few, if any, left of them after the ship had been in action with an enemy, even if she herself were comparatively little the worse for it. What, then, would she have to rely on to repulse a night attack by torpedo boats? In the proposed design they are (four of them) placed in species of wells between the 8-in. guns, so as to be afforded a share of the protection of the 6-in. armor and covered above by stout cupola-like shields inclining forwards. The remaining four of the 12-pounders would not be used in a daylight action with another battleship, but be kept under cover of the armor and mounted in their positions at night-fall. The smaller guns, which form the armament of the fighting tops, would have to take their chance if their fire against a battleship or cruiser is considered necessary, and it cannot be denied that at Santiago the 6-pounders, at any rate, did excellent service. The fighting tops are to rest on a low tower-like foundation, the masts and spars above them being as light as consistent with stability. It would then take a comparatively heavy shot to bring down the fighting top, while, at the same time, the lofty and enormous masts which disfigure and even form a source of danger to many French ships would be avoided. The torpedo armament should be entirely below water, as the dangers attending the use of above-water tubes have been amply demonstrated. Two tubes should be well forward, so placed as to be able to discharge their Whiteheads well on either bow, one right aft, and one on either quarter.

"After the virtual certainty of wooden decks being set on fire by an enemy's shells has been so clearly proved, their abandonment is only a matter of time. The sooner they can be got rid of the better, though a substitute, which is entirely satisfactory, is admittedly rather difficult to find. The specially prepared non-combustible wood, which is now being used to deck some of our new ships, has the defect of being rather heavy. In the proposed type, then, the iron decks are to be coated with a composition of a non-inflammable nature pressed into thin slabs containing a light steel wire grating or network to give them additional strength and cohesion; the outside surface to be hard and smooth. This will have to be produced by pressure and rendered impervious to water. Such a composition of the nature of cellulose or papier-maché should not be difficult for a chemist to discover. The use of such a material would mean a considerable saving in weight. A further slight reduction might be made by a moderate 'tumbling home' in the central portion of the ship, between the two barbettes. This would diminish the weight of the upper and main decks, and add to the stability of the ship. It is the great 'tumble-home' of the sides of the famous French cruiser Dupuy-de-Lôme which alone enables her to bear the burden of her huge cuirass. But forward and aft of the citadel the sides will be the same as in the Formidable, as the 'tumble-home' would here not increase her weatherly qualities, and, moreover, would reduce the roominess and hence the accommodation for the officers and crew. 'Habitability' is a most important point to be attended to in the construction of our ships of war. The long voyages which have to be constantly undertaken by them in the ordinary course of the world-wide duties which fall to their lot, and the cruising and blockading work which would employ them in war time, render the comfort and well-being of their officers and men an important factor in the navy's effectiveness. For this reason in all the larger classes of the types here suggested, the usual scuttles on the main deck are replaced by ports which will admit a larger amount of light and air. That ports are harder to secure in bad weather and more liable to leak is an objection which could surely be overcome by improved appliances.

BELOW-WATER SUB-DIVISION, ENGINES, ETC.

"Turning now to the below-water sub-division by water-tight bulkheading, which is of so great importance, and which in more than one instance in the history of our fleet since its introduction has failed to do its work. In the proposed type, except in one or two places where rushes of men must be provided for or large and bulky articles have to be frequently passed through, the only means of communication between the various compartments is by means of automatic water-tight doors. A door of this type has been patented by a Scotch inventor. It consists of an inner and outer cylinder, the latter built into the bulkhead and having two opposite doors, the former revolving within it and having but one door. One door in the outer cylinder or casing is thus always closed. To pass through, the inner cylinder is revolved by hand till its door coincides with the nearer one. On entering, it is again revolved till its door coincides with the further one in the outer cylinder, when egress is obtained. Doubtless other equally good or even better systems could be devised, the all-important point being that whatever the type of door, it should always automatically close itself and be impossible to leave open. The frames of these doors in the proposed type are not riveted into their places in the bulkhead, but fastened by bolts and nuts, so that if at any exceptional time freer passage than ordinary is necessary, they can be taken out and replaced. Nothing has been hitherto said about the engines, as the experiences of the Chino-Japanese war and that between Spain and the United States do not teach us any particular lessons in this connection, beyond the obvious one that where good machinery gets into the hands of people like Spaniards and Chinese it cannot be depended on for any time at all, as it very soon gets ruined for want of proper care and attention. Thus the Spanish cruisers at Santiago, all new ships, were on paper quite capable of running away from the slower ships of the Americans, but the records of that engagement show that they were being overtaken by them all through as soon as the latter had a full head of steam. Of course, the foulness of their bottoms had a great deal to answer for, but we may be quite sure that the engines were not giving anything like the speed that their trials promised.

"The engines, then, of the proposed type and other types of men-of-war here suggested will follow the general lines of those now in use in our later battleships, cruisers, and smaller craft, whose records in speed and steaming powers are so satisfactory when compared with those of other navies, and which the engineering talent of our nation will steadily improve. The water tube boiler has come to stay, in spite of the great opposition it has met with in various quarters, and so will be fitted in all cases. She will be provided with the double screws which are now almost universal in our navy, as the triple screw, a recent innovation which finds many admirers among foreign nations, and has been adopted in many of their newest men-of-war, does not seem to have proved its superiority to a sufficient extent to warrant any change, especially when the great additional weight of another set of engines is considered."

Then follows a brief description of the electrical equipment. Continuing Major Field says:

INFERIOR ARMAMENT IN CRUISERS—PROPOSED NEW TYPE.

"'The British cruisers are essentially sea-keeping ships, standing well up out of the water, and having good speed, a liberal coal supply, and generous berthing accommodation for the crew; but it must be confessed that in the main the vessels appear to be undergunned, the armament in many of the vessels being light in proportion to the displacement.'

"The foregoing is an American criticism of this portion of our navy, and the facts therein stated can hardly be controverted. But while it may be admitted that the cruisers in question are by no means so heavily armed as are many foreign cruisers of equal or even less tonnage, yet it must be remembered that this numerically inferior armament is deliberately provided after the relative values of coal supply, ammunition and speed have been carefully considered and weighed. A commerce protecting cruiser, spending weeks and months in mid-ocean looking after our great trade routes, must be always ready for action, not only one action, but, it is hoped, many, before it is necessary for her to return to a dock yard. Without coal, therefore, she could not remain on her station, or go at full speed in pursuit of the prowling cruisers of an enemy. Without plenty of ammunition she would be useless after one or two engagements. More guns necessarily mean more weight, which must be taken either from coal, ammunition or protection, so that the supply of powder and projectiles may be doubly curtailed. The cruiser then that we specially require for the express purpose of protecting commerce must have all the good qualities referred to in the American criticism just quoted, and, as she must carry a comparatively moderate armament for her size, this must be amply protected and also the ship herself, as far as possible, after her speed, coal supply and ammunition have been provided for. That this can be done cannot be doubted, when the lightly-armed and armored monsters Terrible and Powerful are compared with the new Drake class, which carry four more 6-in. guns, are far better protected and steam 23 knots to the formers' 21 knots. The following is a description of the proposed commerce protector:

"The displacement of this ship is to be from 12,000 to 15,000 tons. In outward appearance she is to be assimilated as closely as possible to a big mail boat, not only in order to give her a better chance of approaching an enemy's cruisers without arousing suspicion, but also to create among them a feeling of caution when coming up to a mail boat which may, to some extent, favor the latter's escape. There is nothing a 'commerce destroyer' or 'pirate' wants less than a fight, and in the nature of things, the longer their commanders and crews go on with their special role, the more anxious they themselves become to escape capture or destruction. This point, then, is an important one, and should be carried out so that the ship will stand a minute scrutiny through the glass even at a moderate distance. No military tops are then possible, and the funnels should preferably be two only in number, though three might in some cases be permissible, as a few mail steamers carry that number. The armored shields of the 8-in. bow and stern chasers must be concealed by, or made to resemble, the ordinary deck houses of a mail boat. If to do this it is necessary to build actual wooden fittings upon the shields these should be of uninflammable wood and made as light as possible, and either removable or to revolve with the guns. The guns themselves might be partially withdrawn downwards when not in use through an opening on the inner side of the barbette, over which they are placed so that their muzzles would be concealed by the deck house casing. The embrasures for bow fire of the two foremost guns on the main deck to be concealed by carefully fitted and easily lowered light iron screening. All port lids should be as inconspicuous as possible and the lines of scuttles continued over them by dummies where requisite. The cuirass of the ship is to consist of 6-in. armor throughout. The belt will be 6 ft. in width, and there will be a 2-in. armor deck springing from its lower edge. The armor will be continued up to the upper deck in the central portion of the ship, entirely enclosing her battery, which is to consist of two 8-in. quick-fire guns and sixteen 6-in. quick-firers. As in the battleship, the crews of the 12-pounders, of which there are to be sixteen, are to be partially protected by the armor plating and provision made for keeping some in reserve for night work, though in a cruiser of this kind there will, as a rule, be little chance of being attacked by torpedo boats. She will have her sphere of usefulness generally in mid-ocean far beyond the radius of torpedo craft. The same arrangement as to anchors, absence of woodwork, automatic water-tight doors, electric motors, etc., as is indicated for the battleship, are to be followed in the cruiser.

"It will be doubtless observed that in this design the 8-in. quick-fire gun supplants the 9.2 weapon which occupies such a prominent place in the armament of our present cruisers. But it is considered that for cruisers, which are not intended to engage battleships (unless, under favorable conditions, antiquated, ill-armed and slow types), weight for weight the 8-in. gun offers many advantages over that of larger caliber. Two weigh comparatively little more than one 9.2-in. gun. Their penetration is but little less, and their rate of fire out of all proportion more rapid. If we could imagine two vessels (protected by the heaviest armor now carried by cruisers, and in every respect equal) armed, the one with a single 9.2-in. gun, the other with a single 8-in. quick-fire weapon, is it to be denied that the latter would stand first in the betting on a duel between them? If we double the 8-in. guns in the one, victory would be almost a certainty for the ship carrying them. In the events of the two recent wars which we have considered, the weight of evidence goes to show that the damage done by the explosion of the largest classes of shell does not so very greatly preponderate over that attributable to those of medium size. Of course, other cruisers of various sizes and types would be required for other purposes.

CONCLUDING REMARKS.

"In the foregoing attempt to describe generally the various classes of men-of-war, which, in the humble opinion of the writer, seem to be most adapted to our needs, there are doubtless several suggestions as to construction and equipment which a naval architect would perhaps recognize as impracticable. Should this be the case, the criticism must of course be accepted, but this will not vitiate the contention which is made in this

essay: That the main improvement called for in future types of war vessels is the provision of adequate protection. Protection, above all, for their crews, both from the enemy's projectiles and from the fires which, as we have seen from the records of the Chino-Japanese and Spanish-American wars, are so easily kindled by their explosion. Few, if any, ships were put out of action or sunk by penetration at the water line. The causes which led to the destruction of the many Chinese and Spanish ships at the Yalu, at Manila and at Santiago were in almost every case the conflagrations that broke out on board, and the demoralization of their crews by these and by the torrent of projectiles that riddled their unprotected batteries. Surely the removal of these dangers should claim our ardent attention, even if the additional cuirass required has to be paid for by reducing the number of guns carried, or even, to a small extent, the coal. But this may not be necessary after all, for we find also that in practice armor is much more effective than had before been generally supposed. Add to this the recent vast improvements in its resisting qualities, and the desired protection may possibly be attained without any great increase in weight. In attempting to provide for this in the suggested types, it will be noted that the guns lie open to the criticism of being unduly crowded together. To have the gun positions well dispersed is undeniably an advantage in that there is less possibility that a single lucky shot will put more than one out of action. But is this gain sufficient to compensate for the danger incurred by leaving the most important portion of the main deck open to destruction? A complete cuirass of ample thickness cannot well be carried. But that is what would be required if both this and the widely dispersed gun positions are all to be protected as efficiently as the experience of the last two naval wars indicates as being necessary. Is it not better, then, to concentrate the guns in order that a complete armor defence may be provided for them, and, instead of endeavoring to avoid danger by dispersal, boldly defy attack by adequate protection? If the flotation of the ship is also secured and the unarmored portion above the water line fore-and-aft of the citadel rendered fireproof, its riddling and destruction would be a matter of comparatively little consequence. No one would be in it in action, no one would be called on to leave their guns and the armored citadel to put fires out in it; and it is possible that an enemy, recognizing the futility of expending his ammunition on them, would restrict his fire as far as he could to amidships, although here the ship would be best fitted to withstand it.

"In short, what, more than anything else, the exigencies of our world wide empire demand in the ships of its navy is 'staying power'—'staying power' not only in ability to keep the sea by means of ample provision of coal, but also in action. They should be able not only to fight once, but again at short notice. Without this power a victory might be almost as disastrous to us, in our unique position as a nation, as a defeat. Our men, we are proudly confident from our past history, will stand firm and undemoralized under a murderous fire longer than those of any other nation. Our ships should have the same inestimable quality."

LIGHTS IN THE ST. MARY'S RIVER

Recently Capt. Geo. P. McKay, chairman of the committee on aids to navigation of the Lake Carriers' Association, wrote Capt. W. W. Smith, marine superintendent for Pickands, Mather & Co. at the Sault, to call upon Col. Anderson, chief engineer of the Canadian marine department, who made a trip to the Sault river with a view to relieving the vessel interests of some of the expense involved in the maintenance of private lights. Capt. Smith writes Capt. McKay as follows, regarding his conference with Col. Anderson:

"On receipt of your message, I called upon Col. Anderson, chief of engineers, Canadian marine department, and we took a trip up to Point Aux Pins light. He promised when up there that he would put a better light at Point Aux Pins than the present one and that he would furnish a new lamp for the red light on Point Aux Pins dock. I noted when up there that our light-house board has placed a light on Brush point. The light is an extra good one, but there are only three spiles for a crib and it is set away back on the shoal. We could not get within 50 feet of it with the tug. The original plan recommended by the engineers was to place a crib on Brush point out far enough to make a range with Point Aux Pins to run down through the channel until you could pick up the canal ranges. That would have done away with the private ranges at Point Aux Pins; in fact there is no necessity of having them there now anyhow. Col. Anderson went up to Michipicoten on Saturday and returned to the Sault early Monday morning. Mr. Ripley, superintendent of our canal, Mr. Boyd of the Canadian canal, Col. Anderson and myself took a tug Monday morning and went down to the Encampment to look the situation over there. Col. Anderson arranged to re-light the range lights through the new Encampment cut, and has discontinued the upper range lights through the old channel. He promised that he would, as soon as possible, arrange to put range lights on Stribling's point to take the place of Roleau's private lights at that point, and that he would notify you when the change was made."

PITTSBURG STEEL PLATES FOR THE CLYDE.

There is more activity in steel plates than in other lines of furnished material. In the east new business placed has been in 1,000-ton to 5,000-ton lots. While ship yards at the seaboard and on the great lakes are well supplied with work, new vessel business is still coming up and the winter will be a remarkably active one. The surprise is that with their books so well filled, some of the plate mills are still making bids close to a cent on large orders; though on ordinary business they are $2 to $3 a ton higher. A good tonnage is being sent to British ship yards, Pittsburg steel plates being delivered on the Clyde at $32 to $33, as against $39 sked by British mills. —Iron Trade Review.

Since the beginning of the year orders on the Clyde for ships have been scarce. In many of the largest yards not a single contract was placed for month after month. Lately, however, scarcely a day has passed without the appearance of an announcement of fresh work. On a moderate computation it may be said that the orders received by Clyde ship builders within the last fortnight amount to close on 40,000 tons—a larger quantity, in point of fact, than had come to hand for some six months before.—Liverpool Journal of Commerce.

NEXT YEAR'S ORE PRICES.

What prices will be established for Lake Superior iron ores for delivery in 1901 is a question already discussed in a tentative way. That the basis will be considerably below $5.50, which was paid for ore of the Norrie analysis for delivery this year, is well understood. It is equally a foregone conclusion that owners of old-range properties will not part with their ores at any approach to the ruinous prices prevailing when Norrie ore sold at $2.65, or less than one-half the price of today. While it is usual to receive the suggestion of any shortening in the supply of old-range ores with a smile of incredulity, those best informed as to the reserves apart from the Mesabi range put emphasis on this feature of the situation. There are Mesabi ores in plenty—several hundred million tons, not to speak in the exact terms of some recent estimates; but furnacemen, even those most largely interested on the new range, are not willing to work high percentages of these ores. That they will be compelled to do so not many years hence, there is not a particle of doubt. But sufficient unto the day.

Estimates have been made by competent authorities, based upon thorough knowledge of the properties now in operation on the old ranges, as to the extent of the ore reserves on the Vermillion, Gogebic, Menominee and Marquette ranges. They figure out a total of Bessemer and non-Bessemer ores equal to about one-third the estimated reserves of the Mesabi range. On the basis of the consumption of the past year this estimate represents twelve to fifteen years' supply of ore on the old ranges. Some properties, it may be expected, will be active beyond the maximum named; moreover, there may be important ore finds on the unexplored portions of these ranges. Yet mines have given out since these ranges were opened, and others will follow them, as present indications suggest. The past decade has brought no important discoveries on Michigan ranges, though exploration has been carried on industriously and on a large scale by important interests, while multitudes of searchers have been at work in a smaller way. Tens of thousands of dollars have been expended in these operations. In the past year, stimulated by high prices, they have been pushed with redoubled energy. Yet the new discoveries do not come.

The necessity of getting back their investment in the years that remain will have an important bearing on the price policy of Lake Superior producers in the next few years. Therefore the abrupt reduction some interests look for from the prices of today may not come. It will not be surprising if the Bessemer basis for next year falls between $3.50 and $4. —Iron Trade Review.

PROPOSED CHANGE IN ALIGNMENT OF RANGES.

Officials of the Lake Carriers' Association are very much pleased with the disposition shown by the Canadian department of marine and fisheries to render all possible assistance to the vessels of both countries in the matter of new aids to navigation. Col. Wm. P. Anderson, chief engineer of the department, has just made a trip to the Sault river with a view to relieving the vessel interests of a part of the expense connected with the maintenance of private lights in that river.

Col. Anderson makes a suggestion regarding alignment of the different range lights in the Sault river and other places that might be used to advantage, especially in wide channels. He suggests that where there are ranges marking upper and lower ends of channels, each set could be located say 50 ft. to one side of the axis of the channel. If the upper lights, for instance, were placed 50 ft. to the eastward of the center line of a certain channel, and the lower lights 50 ft. to the westward, then a vessel passing up and holding to the upper ranges would pass 100 ft. away from a vessel passing down on the lower ranges. The suggestion has been submitted to the United States light-house officials by Capt. Geo. P. McKay of Cleveland. Of course such a scheme could be carried out only in a fairly wide channel.

WRECK OF THE FONTANA.

The wreck of the Fontena, which is the nastiest and most dangerous that has occurred to lake navigation in recent years, was abandoned to the government by the underwriters during the present week. While the papers of abandonment were on their way to the secretary of war the wreck disappeared entirely, spars gone, with about 3 ft. of water running over it. There was nothing to mark its location except a ripple caused by the strong current and it became, on account of the narrow channel and current, at once the greatest menace on the lakes. Were another freighter to run into it, it would in all probability block navigation for some time. Nothing now remains to be done but for the government to blow up the wreck. That should be done at once. There has been some criticism of the underwriters for leaving the wreck as it is, but even their moral right of abandonment is unquestioned. The underwriters are subject for the loss of the craft, but are under no obligation to stand the additional expense of its removal when no one would bid upon raising it. It is one of the contingencies of navigation and legitimately becomes a governmental charge the same as any other obstruction. When the wreck disappeared Mr. J. H. Sheadle of the Cleveland-Cliffs Iron Co., former owners of the craft, caused steps to be taken in the common interest of navigation to mark the location of the sunken vessel. It is expected that the government authorities will blow up the wreck at once.

Saegertown, Pa., is named for Daniel Saeger, grandfather of Mr. E. Saeger of the Pittsburg Coal Co. Daniel Saeger was one of the pioneers in that part of Pennsylvania which is now the heart of the coal and iron industries. "Going through some of my grandfather's old papers recently," said Mr. Saeger, "I picked up a diary containing notes of an early trip up the Hudson from New York. Under date of May 6, 1823, I found that he was aboard a boat called the Ridgemond, 165 ft. long and 28 ft. beam. He had noted the fact that there were 110 beds on the vessel and that the fare from New York to Albany was $6, while the charge for freight was 25 cents per 100 lbs., and to Buffalo the charge was $1.87½ per 100 lbs. What a profit could be made at such figures in these days!

The Babcock & Wilcox Co. are to fit their boilers in three Atlantic liners—Martello of the Wilson line, and Mongolian and Numidian of the Allan line.

EXPORTS OF AMERICAN COAL.

(Continued from page 17.)

considerable extent; thus, while its annual production of coal is from 30,000,000 to 32,000,000 tons per annum, its imports aggregate 10,000,000 or 11,000,000 tons annually. Other countries produce largely or import largely, but France plays both roles. The imports come from England and Belgium, a little from Germany, and no less than nineteen seaports receive coal, showing that all sections of the country have need of foreign coal, as well as that section reached direct by rail from Belgium. In Germany the high prices of coal and the local demand quite preclude the possibility of heavy exports to France from that country, so that, taken in connection with the conditions in England, it will be seen that the ten million tons required by France may clearly be secured by the United States producers.

"Much stress is laid by foreign consumers, especially by French and German users, on the quality of the coal, and in this regard also the American producer can feel at ease. Nixon's navigation, which is considered the first quality of Cardiff coal, analyzes as follows: Water, .15; volatile matter, 12.00; fixed carbon, 84.30; and ash, 3.55. This coal is not available in quantity, being an extreme high grade, yet Pocahontas, an average American product, analyzes: Water, .47; volatile matter, 19.85; fixed carbon, 77.48; and ash, 2.19. While there are many points in favor of an increased American export coal business, the fact remains that it is a business requiring great capital, and it is not at all certain that any considerable number of firms will go into it, but simply those few large operators who are more or less identified with the chief coal carrying railways, assured as they are of the co-operation of the railway companies and the supply of cars and terminal facilities. Export projects in coal to be successful must be on a Napoleonic scale, and no independent shipper could afford to undertake the risk involved subject to the caprice of a railway management with which he is not in sympathy. The individual anthracite operators have long fought against alleged grievances appertaining to railway facilities and have sought to secure as a measure of relief a foreign market. The export trade now being built up will benefit them, though not in the matter they anticipated. No hard coal can go abroad, but the shipments of soft coal will act as a safety valve to the situation. With any possible overplus of soft coal finding a foreign market, there is and will be no disposition on the part of the bituminous men to make inroads on the anthracite trade, and in this way the pressure of competition in anthracite has already been greatly reduced and the hard coal men are again feeling more at ease. In fact, for the first time in a dozen years they have regained some lost tonnage, and no doubt every citizen in New York hopes that the time is not far distant when our soft coal producers will find it expedient to sell their product abroad and allow our local industries to use the more clean anthracite. In view of present conditions that day is by no means remote."

PRELIMINARY TRIAL TRIP OF THE WISCONSIN.

The battleship Wisconsin failed to complete her preliminary trial trip on Monday, a slight accident sending the vessel to anchorage. The Wisconsin left Potrero early in the morning with a party of Union Iron Works officials and interested naval officers on board and with full steam up, headed up San Francisco bay. After covering about two miles and just as she was getting under speedway, a guide rod on the port engine broke, disabling half of her running gear. The battleship returned for repairs which will occupy about four days. The trial will then be held and she will then go to the Port Orford dry dock. Apart from this trivial accident the Wisconsin operated with the greatest smoothness and the naval officers on board declared themselves delighted with the battleship. Both Capt. Reiter and Lieut. Lilton of the Wisconsin's new crew were present, together with Irving M. Scott. Capt. Pillbury being in command, Quartermaster Anderson steered the Wisconsin on her first venture on deep water. The weather was perfect for a successful run if the unfortunate incident had not occurred. No attempt will be made to attain the maximum speed of 16 knots an hour on the first trip as the foul bottom would be a decided handicap.

The Nickel Plate road announces to the public that Euclid avenue station, Cleveland, is now open for all trains. Passengers may now secure tickets and have baggage checked for all trains east or west bound at this station. 204, Oct. 7.

VALUE OF STOCKS—LEADING IRON AND STEEL INDUSTRIALS.

Quotations furnished by HERBERT WRIGHT & Co., Cleveland, date of September 19, 1900.

NAME OF STOCK.	OPEN	HIGH	LOW	CLOSE
American Steel & Wire.....	33⅛	33⅛	32¼	32¼
American Steel & Wire, Pfd.....	72¾	73	72½	73
Federal Steel	33	33	32	32
Federal Steel, Pfd.....	66	66	65½	65½
National Steel	25¼	25¼	24⅝	24⅝
National Steel, Pfd.....	.....	.....	.....	.....
American Tin Plate	26¾	26¾	26⅛	26⅛
American Tin Plate, Pfd.....	80⅛	80⅛	80	80
American Steel Hoop.....	19	19	18½	18½
American Steel Hoop, Pfd.....	66	66	65⅜	65⅜
Republic Iron & Steel	12⅛	12⅛	11½	11½
Republic Iron & Steel, Pfd	.....	.....	.....	.....

ATLANTIC AND PACIFIC BUILDERS.

A NUMBER OF VESSELS LAUNCHED AND A FEW NEW CONTRACTS NOTED—OPERATIONS IN DIFFERENT YARDS.

The new steamer City of Rockland of the Boston & Bangor Steamship Co., was launched from the yard of William McKie, East Boston, Mass., last week. Miss Marion Hill, daughter of the president of the company, christened the steamer with the customary bottle of champagne. She christened both the Penobscot and City of Bangor. The woodwork of the steamer is being constructed by McKie. She is 300 ft. over all in length, 38 ft. beam over hull and 62 ft. over guards; will have a depth of hold of 14½ ft. from the main deck; from the main deck to the saloon deck will be 9 ft. and from that to the gallery deck will be 8½ ft., and from the gallery deck to the hurricane deck will be 8 ft. All planking used averages 74 ft. in length and some planking and ceiling run nearly 90 ft. and none less than 70 ft. The keel stem and stern posts are of oak of unusually long lengths and the keelsons, ten in number, are of Oregon pine, 14x14, and are also of exceptionally long lengths. She is fitted with steel diagonal strapping from the gunwale to the saloon deck and this with iron hog frames. On the main deck aft of the machinery will be the social hall with grand stairway leading from it to main saloon. The dining room will be in the main saloon, forward. Above the main saloon is the gallery saloon, extending all around the steamer, similar to the City of Bangor. The saloons will be finished in white and gold. She will have speed of 20 miles an hour, and be completed in May, 1901, when she will be put on the route between Boston and Bangor with her sister ship, the City of Bangor.

The tug Sachem, built for the Hartford & New York Transportation Co. by the Columbian Iron Works, Baltimore, Md., left the builders' yard last Saturday. The Sachem was especially designed for service in the shallow waters of the Connecticut river. With 60 tons of coal on board she will draw but 9 ft. 6 in., but can be trimmed with water ballast to about 11 ft. aft when navigating the Sound. The bow of this boat is built extra strong to contend with the heavy up-river ice. The hull is of steel, 115 ft. over all, beam 24 ft. and depth 11 ft. 6 in. She has a compound, vertical, direct acting engine with 20 and 40-in. cylinders by 28-in. stroke of pistons. One Scotch boiler 14 ft. 6 in. diameter by 12 ft. long, allowed 120 lbs. of steam to the square inch, with three corrugated furnaces, will furnish the power. This tug is supplied with a powerful wrecking and fire pump, electric lights and all modern improvements applicable to this class of vessel.

The four-masted schooner J. Edward Drake was launched last week from the New England Co.'s yard, Bath, Me. The official measurements of the vessel are: Length, 182 ft. 6 in.; breadth, 37 ft. 3 in.; depth, 17 ft. 5 in.; gross tonnage, 910.64; net tonnage, 789.32. The carrying capacity is about 1,400 tons. She was built for the general coastwise trade, and will be commanded by Levi S. Wiley. The Drake has an oak keel, hardwood and hack frame, yellow pine planking 4½ in. thick from garboard to gunwale, composition fastened. The masts are Oregon pine, 94 ft. long, 26 in. in diameter. The rigging is wire. The cabin is finished in quartered oak and sycamore and the staterooms in whitewood. The vessel has a Hyde windlass outfit. She is all rigged, and will be ready for the sea the last of this week. She is owned by James B. Drake and others of Bath.

The California Dry Dock Co. is to erect a large dry dock at Hunter's point, San Francisco. The company has been organized very recently and is composed of some of the best known shipping and business men of San Francisco. The new dock will be 750 ft. long from the gate seat, with a width at the coping of 122 ft. and at the bottom of 74 ft., having a depth over the sill below the coping of 32½ ft., or 28 ft. at high water. It is to be excavated in solid rock of green serpentine. The entrance to the dock will be closed by a floating caisson built of structural steel.

The Maryland Steel Co., Sparrow's Point, Md., is said to have secured a contract to build three freight steamers for Boston capitalists. Alfred Winsor of the Boston & Philadelphia Steamboat Co. is largely interested in the deal, and Kidder, Peabody & Co. will finance it. The vessels are to be of steel, twin screw, 500 ft. in length and 58 ft. beam. They will have a speed of about 14 knots.

Moran Bros. Co., Seattle, Wash., launched this week a schooner for Capt. E. E. Caine. The vessel is 183 ft. long, 41 ft. wide and 15 ft. deep. She is already chartered to take 1,000,000 ft. of lumber to Sidney.

Paul Le Roux of Catskill, N. Y., has been granted a contract to build a steamboat for the Atlantic & Castleton Steamboat Co. The vessel will be 120 ft. long, 28 ft. wide and 8 ft. deep.

NAPOLEON AS A BRITISH SAILOR.

There are, we fancy, very few people who know that the great Napoleon once applied for permission to enter the British navy. Such, however, according to the Naval & Military Record, is the fact, and Mr. Goschen has recently discovered in the archives of the admiralty the original letter in which the request is made by Bonaparte, then a student at Brienne. He was, as everyone knows, then preparing for a military career, but the school inspectors reported that he would make an excellent naval officer, and Sir William Fraser relates that his application to the British admiralty was due to the influence of his fellow-student, Lawley, afterward Lord Wenlock. Our contemporary adds: "Bonaparte, when sending the letter, expressed his belief that the application would not be successful, because, though not religious himself, he came of a Roman Catholic family, and at that time Roman Catholics were not welcome on British warships. As we all know, Bonaparte proved a true prophet. Singularly enough, it was only chance which, at a later date, prevented him from entering the British army. Paoli, the Corsican 'patriot,' strongly urged him to do so. Paoli at that time had some influence in British military circles and would have procured Napoleon a commission. The latter considered the offer seriously and then declined it on the ground that the French revolution offered brilliant opportunities for a young officer just starting his career. So he placed his sword at the disposal of his adopted country."—London Globe.

SCOTCH SHIP BUILDING DURING AUGUST.

The new tonnage put into the water by Scottish builders last month makes, with one exception, the best August output for more than ten years past. The figures were 38,185 tons, against 41,350 tons in the corresponding month of last year. The next best August was that of 1895, when the new tonnage launched amounted to 37,104 tons. To the total the Clyde contributed 32,955 tons; the Forth, 1,000 tons; the Tay, 2,440 tons; and the Dee, 1,790 tons; but the latter quantities are in each case represented by small vessels. The largest vessel launched on the Clyde was the Indian troopship Hardinge, of 5,600 tons. She was the only vessel over 5,000 tons. There were two between 4,000 tons and 5,000 tons, and the same number between 3,000 tons and 4,000 tons, and 2,000 tons and 3,000 tons; eight were between 1,000 tons and 2,000 tons; 13 between 100 tons and 500 tons, and one under 100 tons. The total tonnage launched across the Tweed for the eight months of the year amounts to 321,460 tons, which is the best eight months record for many years past, exceeding last year's—which was the record since 1890—by 1,750 tons. The following table shows the position of Scottish ship building up to the end of August:

	No. of vessels.	August, tons.	Eight months, tons.
1900	29	38,185	321,460
1899	25	41,350	319,710
1898	20	29,514	272,463
1897	24	33,832	210,562
1896	25	21,838	248,715
1895	31	37,104	248,071
1894	21	36,904	232,414
1893	29	26,213	191,066
1892	27	25,487	273,125
1891	24	22,733	230,369
1890	24	35,881	264,416

The Clyde launched this August twenty-two vessels of 32,955 tons, and last August the Clyde launched twenty-one vessels of 36,750 tons. The average tonnage of the Clyde last month was 1,497.95 tons; August 1899, 1,750.00 tons. During the month orders for some 30,000 tons were placed on the water, and about 25,000 tons of new work was booked. As a matter of fact, fully 60,000 tons have been contracted for, but this is not admitted by the ship builders. On the northeast coast of England quite 50,000 tons of new work has been placed, while Workman, Clark & Co. are also reported to have secured one or two very important orders. There is still a large amount of work to be given out, but ship owners are meantime awaiting developments. They hope to place their contracts on cheaper terms than are at present ruling.

U. S. Engineer Office, Detroit, Mich., Sept. 14, 1900. Sealed proposals will be received here until 12 noon, Oct. 30, 1900, and then publicly opened, for furnishing material and labor of all kinds necessary to construct and put in operation one large steel hulled self-propelling sea-going hydraulic dredge, with all necessary appliances complete, including electric light plant, distilling and refrigerating machinery. Information furnished on application. Thos. H. Handbury, Major, Engrs. Oct. 18.

U. S. Engineer Office, 185 Euclid Ave., Cleveland, O., August 21, 1900. Sealed proposals for Stone Reinforcement and Repair of Jetties at entrance of Port Clinton Harbor, Ohio, will be received here until 2 o'clock, P. M., standard time, September 21, 1900, and then publicly opened. Information will be furnished on application. Jared A. Smith, Col., Engrs. Sept. 20.

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Stratford Oakum Co., Geo.....Jersey City, N. J.

OILS AND LUBRICANTS.
Dixon Crucible Co., Jos.....Jersey City, N. J.
Standard Oil Co.....Cleveland.

PACKING.
Jenkins Bros.....New York.
Katzenstein, L. & Co.....New York.
Phenix Metallic Packing Co.....Chicago.
U. S. Metallic Packing Co.....Philadelphia.

PAINTS.
Baker, Howard H. & Co.....Buffalo.
Smith, Edward & Co.....New York.
Upson-Walton Co.....Cleveland.

PAINTING MACHINES, PNEUMATIC.
Chicago Pneumatic Tool Co.....Chicago.

PATENT ATTORNEYS.
Thurston & Bates.....Cleveland.

PATTERN SHOP MACHINERY.
Fay & Egan Co., J. A.....Cincinnati, O.
Woods Machine Co., S. A..... .....So. Boston.

PIPE, WROUGHT IRON.
Bourne-Fuller Co.....Cleveland.

PLANERS OF ALL KINDS.
Niles Tool Works Co.....Hamilton, O.

PLANING MILL MACHINERY.
Fay & Egan Co., J. A.....Cincinnati, O.
Woods Machine Co., S. A.....So. Boston.

PLUMBING, MARINE.
Ellis Marine Plumbing Co.....New York.
Mott Iron Works, J. L.....New York.
Sands, Alfred B. & Son.....New York.
Kenney, The Co.....New York.

PNEUMATIC TOOLS.
Chicago Pneumatic Tool Co.....Chicago.
Philadelphia Pneumatic Tool Co.....Philadelphia.
Standard Pneumatic Tool Co..... .....Chicago.

POLISH FOR METALS.
Bertram's Oil Polish Co.....Boston, Mass.

PROPELLER WHEELS.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bath Iron Works Ltd.....Bath, Me.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Shipbuilding Co.....Detroit.
Farrar & Trefts.....Buffalo.
Fore River Engine Co..... .....Weymouth, Mass
Hardy, John B..... .....Tacoma, Wash.
Hyde Windlass Co.....Bath Me.
Harlan & Hollingsworth Co.....Wilmington, Del.
Hodge, S. F. & Co.....Detroit.
Jenks Ship Building Co.....Port Huron, Mich.
MacKinnon Mfg Co.....Bay City, Mich.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Morse Iron Works & Dry Dock Co.....Brooklyn.
Neafie & Levy Ship & Eng. Bldg Co...Philadelphia.
Newport News Ship Bldg. Co..Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Phosphor Bronze Smelting Co., Ltd...Philadelphia.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works.....San Francisco.
Sheriffs Mnfg. Co.....Milwaukee.
Trigg, Wm. R. Co.....Richmond, Va.
Trout, H. G.....Buffalo.
Union Iron Works.....San Francisco.

PROJECTORS, ELECTRIC.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Rushmore Dynamo Works.....Jersey City, N. J.
Westinghouse Electric & Mnfg. Co...Pittsburg, Pa.

PUMPS FOR VARIOUS PURPOSES.
Blake, Geo. F. Mnfg. Co.....New York.
Davidson, M. T.....Brooklyn, N. Y.
Kingsford Foundry & Machine Works..... .....Oswego, N. Y.
Van Duzen, The E. W. Co.....Cincinnati.
Worthington, Henry R.....New York.

PUNCHES, RIVETERS, SHEARS.
Cleveland Punch & Shear Works Co.. ...Cleveland.
New Doty Mnfg. Co.....Janesville, Wis.
Niles Tool Works Co.....Hamilton, O.
Wood & Co., R. D.....Philadelphia.

REGISTER FOR CLASSIFICATION OF VESSELS.
Great Lakes Register.....Cleveland.

RELEASING HOOKS FOR DETACHING BOATS.
Standard Aut. Releasing Hook Co.....New York.

RIVETS, STEEL, FOR SHIPS AND BOILERS.
Bourne-Fuller Co.....Cleveland.
Champion Rivet Co.....Cleveland.

RIGGING ROPE (WIRE).
American Steel & Wire Co.....Chicago.

RUBBER INSULATED WIRES.
Roebling's Sons, John A..New York and Cleveland.
American Steel & Wire Co.....Chicago.

SAFETY VALVES.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.

SAIL MAKERS.
Baker, Howard H. & Co.....Buffalo.
Upson-Walton Co.....Cleveland.
Wilson & Silsby.....Boston.

SALVAGE COMPANIES.
See wrecking companies.

SCHOOLS, CORRESPONDENCE — ENGINEERING AND NAVIGATION.
International Correspondence Schools.....Scranton, Pa.

SCREW MACHINES.
Niles Tool Works Co.....Hamilton, O.

SEARCH LIGHTS.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Rushmore Dynamo Works.....Jersey City, N. J.
Westinghouse Electric & Mnfg. Co...Pittsburg, Pa.

SEPARATORS, (CENTRIFUGAL).
Keystone Engine & Machine Works, W. L. Simpson, Engineer.....Philadelphia.

SHAPERS.
American Tool Works Co. (The).....Cincinnati.
Niles Tool Works Co.....Hamilton, O.

SHEARS.
See punches, riveters and shears.

SHIP AND BOILER PLATES AND SHAPES.
Bourne-Fuller Co.....Cleveland.

SHIP BUILDERS.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bath Iron Works, Ltd.....Bath, Me.
Buffalo Dry Dock Co.....Buffalo.
Cramp, Wm. & Sons.....Philadelphia.
Craig Ship Building Co.....Toledo, O.
Chicago Ship Building Co.....Chicago.
Detroit Shipbuilding Co.....Detroit.
Fore River Engine Co.....Weymouth, Mass.
Hardy, John B.....Tacoma, Wash.
Harlan & Hollingsworth Co.....Wilmington, Del.
Iowa Iron Works.....Dubuque, Ia.
Jenks Ship Building Co.....Port Huron, Mich.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Morse Iron Works & Dry Dock Co..... ...Brooklyn.
Neafie & Levy Ship & Eng. Bldg. Co .Philadelphia.
Newport News Ship Bldg. Co...Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works.....San Francisco.
Roach's Ship Yard.....Chester, Pa.
Townsend & Downey Ship Bldg. Co.....New York.
Trigg, Wm. R. Co.....Richmond, Va.
Union Dry Dock Co.....Buffalo.
Union Iron Works.....San Francisco.
Willard, Chas. P. & Co..... .....Chicago

SHIP CHANDLERS.
Baker, Howard H. & Co.....Buffalo.
Marine Supply Co..... .....Fairport Harbor, O.
Moran, Bros. Co.....Seattle, Wash.
Upson-Walton Co.....Cleveland.

SPARS—LARGE SIZES.
Moran Bros. Co.....Seattle, Wash.

STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.
Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

STEAM VESSEL FOR SALE.
Holmes, Samuel.....New York.

STEEL OR IRON STAYBOLTS, HOLLOW OR SOLID.
Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

STEAMSHIP LINES, PASS. AND FREIGHT.

American Line.....New York.
Erie & Western Trans. Co.....Buffalo.
International Nav. Co.....Philadelphia.
Red Star Line.....New York.

STEEL SHAFTS, SOLID OR HOLLOW.

Bethlehem Steel Co.....So. Bethlehem, Pa.

STEERING APPARATUS.

American Ship Building Co.....Cleveland.
Chase Machine Co.....Cleveland.
Detroit Shipbuilding Co.....Detroit.
Electro-Dynamic Co. .....Philadelphia.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.
Queen City Engineering Co.....Buffalo.
Sheriffs Mfg. Co.....Milwaukee.

STOCKS, BONDS, SECURITIES.

Wright, Herbert & Co.....Cleveland.

STOCKLESS ANCHORS.

Baldt Anchor Co.....Chester, Pa.
International Anchor Co.....Cleveland.

STRUCTURES OF STEEL, BUILDERS OF.

American Bridge Co.....New York.

SURVEYORS, MARINE.

Curr, Robert.....Cleveland.
Gibbs & Joys.....Milwaukee.

TELEGRAPH—DECK AND ENGINE ROOM.

Cory, Chas. & Son.....New York.

TESTS OF MATERIAL.

Hunt, Robert W. & Co.....Chicago.
Pittsburgh Testing Laboratory, Ltd.....Pittsburgh.

THERMOMETERS FOR MECHANICAL PURPOSES.

Helios-Upton Co.....Peabody, Mass.

TIMBER—LARGE PIECES.

Moran Bros. Co.....Seattle, Wash.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.

Chicago Pneumatic Tool Co.....Chicago.
Cleveland Punch & Shear Works Co. ...Cleveland.
New Doty Mnfg. Co.....Janesville, Wis.
Niles Tool Works Co.....Hamilton, O.
Pelton Engineering Co.....Cleveland.
Philadelphia Pneumatic Tool Co.....Philadelphia.
Standard Pneumatic Tool Co.....Chicago.
Wood & Co., R. D.....Philadelphia.

TOOLS, WOOD WORKING.

Fay & Egan Co., J. A.....Cincinnati, O.
Woods Machine Co., S. A.....So. Boston.

TRUCKS.

Boston & Lockport Block Co.....Boston, Mass.

TOWING MACHINES.

American Ship Windlass Co.....Providence, R. I.
Chase Machine Co.....Cleveland.
Playfair's Barge & Tug Line.....Midland, Ont.

TOWING COMPANIES.

Calvin Co., The.....Kingston, Ont.
Donnelly Salvage & Wrecking Co...Kingston, Ont.
Swain Wrecking Co.....Detroit.

TUBING FOR BOILERS.

Atlantic Tube Co.....Pittsburg.
Shelby Steel Tube Co.....Cleveland.

TUBES, SEAMLESS DRAWN, BRASS AND COPPER.

Hungerford Brass & Copper Co., U. T.....New York.

VALVES, STEAM SPECIALTIES, ETC.

American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.
Jenkins Bros.....New York.

VARNISH MAKERS, COLOR GRINDERS, ETC.

Smith, Edward & Co.....New York.

VARNISH PAINT.

Mair, John & Son.....Philadelphia.

VESSEL AND FREIGHT AGENTS.

Boland, John J.....Buffalo.
Brown & Co.....Buffalo.
Bull & Co, A. H.....New York.
Drake & Maytham.....Buffalo.
Elphicke, C. W. & Co.....Chicago.
Gibbs & Joys.....Milwaukee.
Hall & Root.....Buffalo.
Hawgood & Moore.....Cleveland.
Helm, D. T. & Co.....Duluth, Minn.
Holmes, Samuel.....New York.
Hutchinson & Co.....Cleveland.
Keith, J. G. & Co.....Chicago.
Mitchell & Co.....Cleveland.
Moffat & O'Brien.....San Francisco.
Pauly, H. J.....Milwaukee.
Richardson, W. C.....Cleveland.

VENTILATING APPARATUS FOR SHIPS.

Buffalo Forge Co.....Buffalo.
Sturtevant Co., B. F.....Boston.

WIRE ROPE AND WIRE ROPE FITTINGS.

American Steel & Wire Co.....Chicago.
Baker, H. H. & Co.....Buffalo.
Roebling's Sons, John A..New York and Cleveland.
Upson-Walton Co.....Cleveland.

WHISTLES, STEAM.

American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.
Signal & Control Co.....New York.

WINDLASSES.

American Ship Windlass Co.....Providence, R. I.
American Ship Building Co.....Cleveland.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.

WINCHES.

American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co.....Bath, Me.

WOOD WORKING MACHINERY.

Fay & Egan Co., J. A.....Cincinnati, O.
Woods Machine Co., S. A.....So. Boston.

WORM GEARING.

Morse, Williams & Co.....Philadelphia.

WRECKING AND SALVAGE COMPANIES.

Calvin Co., The.....Kingston, Ont.
Donnelly Salvage & Wrecking Co...Kingston, Ont.
Playfair's Barge & Tug Line.....Midland, Ont.
Swain Wrecking Co.....Detroit.

YACHT SAILS, FITTINGS, HARDWARE, ETC.

Wilson & Silsby.....Boston.

YACHT AND BOAT BUILDERS.

Drein, Thos. & Son.....Wilmington, Del.
Electric Boat Co.....New York.
Gas Engine & Power Co.....New York.
Lane & DeGroot.....Brooklyn.
Willard, Chas. P. & Co.....Chicago.

YAWLS.

Drein, Thos. & Son.....Wilmington, Del.
Lane & DeGroot.....Brooklyn.

ALPHABETICAL INDEX OF ADVERTISERS IN THE MARINE REVIEW.

The star (*) indicates that the advertisement appears alternate weeks. For addresses see advertisements on pages noted.

LAKE SHORE & MICHIGAN SOUTHERN RAILWAY.

CLEVELAND CITY TICKET OFFICE,
237 SUPERIOR STREET.

	Eastward:—	Ar. fr. West.	Dep. East.
No. 18,	Southwestern Limited	.....	*1 55 am
No. 22,	Lake Shore Limited	*2 15 am	*2 20 am
No. 28,	New York & Boston Express	*7 40 am	*8 00 am
No. 32,	Fast Mail	*11 25 am	*11 30 am
No. 44,	Accommodation, via Sandusky	†1 15 pm	.....
No. 46,	Southwestern Express	.....	*3 00 pm
No. 6,	Limited Fast Mail	*5 40 pm	*5 45 pm
No. 10,	Chicago, New York & Boston Special	*7 35 pm	*7 40 pm
No. 16,	New England Express	*10 30 pm	*10 35 pm
No. 2,	Day Express	†9 05 pm	†9 20 pm
No. 126,	Norwalk Accommodation	†7 55 am	.....
No. 40,	Toledo & Buffalo Accom., via Norwalk.	†10 00 am	†10 30 am
No. 126,	Norwalk Accommodation	†7 55 am	.....
No. 116,	Conneaut Accommodation	.....	†4 30 pm

	Westward:—	Ar. fr. East.	Dep. West.
No. 11,	Southwestern Limited	*3 25 am	.....
No. 15,	New York, Boston & Chicago Special	*3 05 am	*3 10 am
No. 21,	New York & Chicago Express	*5 10 am	*5 20 am
No. 7,	Day Express	.....	†6 30 am
No. 19,	The Lake Shore Limited	*7 35 am	*7 40 am
No. 23,	Western Express	*11 10 am	*11 15 am
No. 33,	Southwestern Express	*12 25 pm	.....
No. 133,	United States Express	.....	*12 40 pm
No. 47,	Accommodation	.....	†3 00 pm
No. 141,	Sandusky Accommodation	.....	†3 10 pm
No. 127,	Norwalk Accommodation	.....	†5 10 pm
No. 37,	Pacific Express	*6 35 pm	*7 00 pm
No. 3,	Fast Mail Limited	*10 50 pm	*10 55 pm

*Daily. †Daily except Sunday.
Trains Nos. 28 and 37 run via Erie station.

WANTED FOR SALE, FOR CHARTER Etc.

Space under this heading 25 cents a line, each insertion, for three insertions or less. Special rates for periods of more than three insertions.

—FOR SALE—Two tugs, one of 65 ft. keel with engines 20x22 and the other of 61 ft. keel with engines 20x20. Ranney Bros., 34 River st., Cleveland. Oct. 11.

—WANTED—Marine boiler of about 6 by 11 ft. High steam. J. M. Clow, Marinette, Wis. Sept. 12

—FOR SALE—Tug, length 56 ft., beam 12½ ft., depth 5½ ft. Engine 10x10. Boiler pressure allowed, 110 lbs. Tug is too small for our business. For further particulars address Crau & Balow, St. Joseph, Mich. Sept. 27

—FOR SALE—Passenger steamer. Thirty-three staterooms. Modern in every way and in first-class condition. Not large enough for service in which she is now engaged. Address M. B., Marine Review, Cleveland. Oct. 4

—FOR SALE—Good tug, six years old. Engines 18x20. Boiler allowed 130 pounds steam pressure. Address Box 284, Ashland, Wis. tf

—FOR SALE—Marine boiler of 6½ by 12 feet. Allowed 110 pounds steam. Never been cut. Also breeching smokestack and grates. E. E. Koch, Sandusky, O. Sept. 21.

—FOR SALE—Scotch marine water-back boiler; 7 feet diameter, 11 feet long; dome 30x30 inches; furnace 40 inches diameter; 69 3-inch tubes, 8 feet 6 inches long. Built under government inspection and just completed. Price $2,000. F. O. B. cars Minneapolis. Address Nicollect Island Boiler Works, Minneapolis, Minn. tf

MARINE REVIEW

VOL. XXII. CLEVELAND, O., SEPTEMBER 20, 1900. No. 12.

Pictures of 200 Ships.

The Marine Review will have them in a few days.

List will be announced later.

A PHOTOGRAPHER, SENT TO THE ST. CLAIR RIVER, HAS BEEN AT WORK FOR A MONTH PAST.